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PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

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# Editorial Notes.

## Long and Loyal Service—An Idea and a Question.

OPPORTUNITY is said to be a fine thing; and we know that it is when the occasion permits of the performance of some good, beneficial, or appropriate deed. The speeches which the President (Mr. H. D. Madden), Mr. H. C. Smith, and Mr. F. C. Briggs made at the "Charter" meeting of the Institution, as reported last week, showed how the Council had taken the opportunity, when applying for a Royal Charter, to amend the by-laws, broaden the basis of membership, and enhance the intrinsic value of membership—all of which has been voted to be excellent work to accomplish at one time. In dealing with the petition for the Charter and the amendment of the by-laws, and the decision that the two things should be carried at the same time, Mr. Briggs said: "This "emerged at one Committee meeting; and at the subse- "quent meeting, not more than a fortnight later, we were "presented with, for consideration, the draft in print of "the petition for the Royal Charter and the amended "rules. This must have been almost entirely the work "of the Secretary (Mr. Dunn), aided by the Solicitor (Mr. "Shrimpton). This shows the enthusiasm with which the "Institution is served by the Secretary." It was a big and constructive piece of work that was performed in that fortnight. Before the "Charter" meeting ended, a hearty vote of thanks was passed to the Secretary for the work he had done in conjunction with the Solicitor. There for the moment the matter ends. The incidents, however, revive a thought that has occurred more than once; and it seems to us that the opening of a new era in the history of the Institution is an opportunity—and an appropriate time—to make mention of it. The name of Walter T. Dunn has been associated with the Institution so long that it is impossible to speak of the one without thinking of the other. Presidents and Councils come and go; Dunn does not. He goes on from year to year, and is the one permanent living link in official capacity with the past. We have known over the past half century all the Secretaries of our central technical organization; but never has there been one who filled the office for so many years, or who was so qualified by nature and attainment as Walter Dunn to carry out its functions. Indeed, no one has a longer or more intimate knowledge of the history of the central technical organization; he is the repository of all the rules of administrative conduct for President and Council; and they each and all acknowledge how much they rely upon him to keep them correct in their doings, and how much they are indebted to him. Upon him rests the responsibility of seeing that the instructions of the Council are carried out, and exercising scrupulous care in assuring that the full programme of work and the details connected with the various interests of the organization are duly completed. The loyalty and conscientiousness with which all duties and responsibilities are performed have been the subject of acknowledgment by Presidents and members over many years. It is 32 years ago—1896—that Mr. Dunn first appeared as Secretary at an annual meeting of the Gas Institute. The idea which has been revived by the petition for a Royal Charter and the new by-laws, and which we now venture to put forward for consideration, will be found in the question: "Is there no honour in the hands of the Council "which could be awarded to one who has done so much "in watching over, defending, and advancing the interests "of the Institution through so many years?" If there is, then there could be no better time for conferring it than when a new chapter in the history of the Institution is about to be opened.

## Influence of Technical Advance on the Industry's Economics and Trading.

AMONG Presidential Addresses the one which Mr. H. H. Gracie, of Edinburgh, delivered to the North British Association of Gas Managers last Friday will rank as a veritable *magnum opus*. It is the result of a wonderful piece of research work, carried out with infinite care, which has given precision to result and deduction; and the objective of it all is to ascertain (by using the records of the Edinburgh gas undertaking as the seat of investigation) how the industry has advanced technically and commercially, and how that advance has operated on finance and the general well-being of the concern to the advantage of the community at large. Briefly put, the elevation of working standards that has been effected during the past forty years—the years during which the city gas supply has been under municipal administration, and during the greater part of which period the President has been associated with the undertaking—has gone far to neutralize the higher costs which have come upon the industry, which fact negatives the jeremiads of those who accuse the industry of not having effected much progress, while its competitors have made great headway. The achievements as brought out one by one by the President stand as a contradiction; they are facts of the most stubborn kind. As we read the evidence, it is seen that in no direction has the industry been dormant; and this applies to both its technical and commercial interests. It is the sum of advance that has done so much to annihilate the increased obligations the industry has had to bear. Coal has gone up in price; but new processes have improved the yield per ton. Wages are higher; but the cost of labour per unit of production has been lessened. So we go on step by step to the marvellous changes in the scope of gas applications and use, which, though the costs of doing business are greater, have provided good compensation. In all these advances, as the President demonstrates, the industry has called to its aid and service the knowledge that has been gained in the scientific, physical, chemical, and mechanical realms. Difficulties and problems have arisen, but they have been solved. In the commercial field, the art of business development has been learned. The industry has knowledge of the value of a

low price, of the application of technical discovery to promoting utilization efficiency, and of giving active and real service to protect and stimulate business. The progress has not been merely in plant and process, in consuming appliances and utilization; it is also found in appreciation which has broadened administrative outlook. It has been all to the good, and the business development has proceeded though hard pressed by competition.

It would be impossible to review within the compass of an editorial article the abundance of material with which Mr. Gracie composed his address; but we will attempt to glance at the various channels along which in his investigation he has found development. In the first place, during the four decades over which investigation has been made, the make of gas in Edinburgh has increased by nearly three times; but the number of consumers has not quite doubled, which points to the fact that the consumption *per capita* has greatly advanced, which in itself is an economy in respect of overhead charges. We know of the consumption-reducing effect of the incandescent burner, while giving much increased illumination for a smaller expenditure, but the reduction in consumption has been completely submerged by the development which has taken place in the use of gas for cooking, heating, hot-water supply, and industrial heating and power applications. All such development has an advantageous effect upon the manufacturing operations. But there again we have, making a valuable contribution to the advance of economy, the fact that, through the higher yield of gas per ton of coal compared with the early years in the period of inquiry, the quantity of coal required is in proportion to output very much less; and, albeit the price of gas has ascended by about 100 p.ct., the greater yield of primary and secondary products, with the enhanced value of the latter (due partly to the improvement of their quality and the altered states of the markets), has contributed some compensation. For the higher yields and the better quality of coke, and the improved returns for it and other bye-products, some credit must be given not only to the improvement in plant, and its better adaptability to the treatment of different classes of coal, but to the selection and blending of suitable coals, according to the directions obtained from close examination, analysis, and testing—all of which gives coke of improved quality, while assisting to accelerate the carbonization process. The care now exercised in cooling, selecting, and grading coke to comply with the use to which it is to be applied, and the development of new outlets for it, have combined to enhance its value. The better treatment of tar and the large absorption for road purposes have also produced excellent effects in progress; but bye-product sulphate of ammonia, while on the pinnacle of achievement in respect of quality, is disturbed in market value by the synthetic member of the fertilizer family.

In the next place, as Mr. Gracie reminds us, the capital debt of an undertaking is sometimes a heavy burden, and operates to keep the price of gas at a higher level than it would otherwise be. In the case of Edinburgh, the Presidential Address informs us, there were really two capitals with which to contend—one representing the purchase of the original Companies' undertakings, and the other the expenditure incurred in the building of the new works at Granton. The two capitals were obviously a handicap. Nevertheless, the writing-down and liquidation of the capital have been done in such systematic manner, and have synchronized with the great expansion in business, that its effect on price is now comparatively small, and is on a descending scale. Of course, in latter years, the heavy expenditures for materials and labour, especially the requirements for repairs and maintenance of plant, have been a heavy obligation; but this again has stimulated ingenuity in designing plant so as to withstand heavy wear and tear, and enable close supervision in working to keep it in proper condition. In passing, it may be said that it is, of course, good policy at times to spend a little more capital in order to modify the expenditure for repairs and maintenance. Then in regard to wages, it is interesting to note from the address that whereas circumstances have combined to increase rates to about two-and-a-half times what they were in the early years with which comparison is made, yet, through the adoption of labour-saving appliances, operating costs have been reduced, and at the same time the work of the men has been simplified, and the physical strain upon them greatly reduced. On the other hand, while on the manufacturing side the ratio of workers to production has been lowered, the number of workers required for the distribution and sales section has been ascending. Therefore the industry has not on balance, through its technical advances, receded as an employer of labour, but has progressed, and for work of a higher standard than existed at the commencement of the period with which Mr. Gracie deals. Then it is seen that rates and taxes have advanced enormously, due in part to national and local requirements, and partly to the heavy capital burden to which reference has been made. Fortunately, however, the increased charge is spread over a much greater output of gas, which has helped to lighten the burden per unit.

Turning again to business expansion, one is struck by the enormous growth of the area supplied by gas from the works under the President's care. It has increased from 15 to 52 sq. miles—this being due to the enlargement of the city boundaries and the incorporation of suburban areas—thus benefiting a larger community by the delivery of cheap gaseous fuel. In the development, too, of gas trading, the industry now provides gas-using appliances on easy terms through hire or hire-purchase, with free fixing. The maintenance and repair of these appliances have been accepted as a duty and an advantage. Showrooms and demonstration rooms have come, and have already been improved upon. Among other instructive matters which project from the address, as found in the experience of Edinburgh, are the periods of the year and of the day in which the greatest consumption progress has been effected. The use of gas in the summer time is now so large that the maximum winter load is barely twice the summer one, whereas formerly it was four-and-a-half times as much. Regarding the hourly demand, the forenoon load is now approximately four times what it was seventeen years ago, whereas the maximum evening load has only advanced about 4 p.ct. While the noon load seventeen years ago was only one-quarter of the evening load, it is now nearly equal to it, showing how the curve has been flattened out and almost equalized, due to the extra demand for gas for cooking and the scrapping of the extravagant kitchen coal-range. A further result of progress is the longer period during which the heavy winter load has to be provided for. The whole tendency is to make greater use of the plant; and thus less time is available in the year for carrying out repairs, which in one respect is a disadvantage, as it narrows the period of operation for the contractors. However, the work that the industry has done and is doing is of great national value, in that it has contributed to a purer atmosphere, and to cleanliness, labour-saving, convenience, and comfort in the home and the factory.

We have looked on Mr. Gracie's pictures—presented by word, data, diagrams, and charts—of forty years ago and of to-day, and we are content with the progress and the lessons which they portray. Much has occurred in the four decades of which the industry is proud; and it leads to the capital fact that, notwithstanding greatly increased costs, and many vicissitudes and difficulties, the industry serves the public with gas at a substantially lower price than it did in the less economical and efficient days that saw the President's advent in the industry—in fact, the price of gas to-day shows a lower advance than most other commodities have done since the war. The knowledge required and the responsibility of those who have to manage gas undertakings to-day are vastly different from the requirements of the past. Mr. Gracie recalls how in the less anxious days and times of lighter responsibility, there were separate engineers and managers for the two works supplying Edinburgh and Leith; to-day, the direction of the entire, co-ordinated undertaking is under one General Manager. But the history of the progress of our industry as illustrated in the address, with the increased knowledge and ability that the work claims to-day, and the greater responsibility it imposes, should be an invitation to young men to come into the profession, and to give of their best efforts to carry on the beneficial service of providing and spreading the use of gas among the whole community. It is not only beneficial work, it is highly interesting, and there is nothing

humdrum about it. But, on every hand, administrators must realize that the inherent conditions of the industry which demand so much for its efficient conduct from those of professional attainment also call for adequate reward to those who respond to its invitation. The lessons of the spacious address before us are remarkable, and over them all can be written "Success."

## Benzole Exploration.

IN later columns a review is made of the fifth annual report of the Joint Research Committee of the National Benzole Association and the University of Leeds. As is remarked in the opening of the review, this report maintains "the high standard of research which has characterized previous reports, and provides an interesting and useful account of the application of science to the solution of commercial problems." The National Benzole Association are to be complimented upon their enterprise in making possible this work, which is of value not only to the carbonizing industries, but to the nation at large when consideration is given to the important place that benzole has to-day in our daily service. We can foresee that as the years roll on it will gain greater and greater importance, having in view the world's requirements for motor spirit, and its daily increasing consumption in every land and especially in the United States, where so much is produced, and where the consumption is increasing annually not only through the growth of the number of motor-cars in use, but the growth of the average consumption of spirit per motor-car. We have to look forward; and certainly the work that the Benzole Research Committee are doing, while of vast value to-day, is paving the way to the times when benzole will be of still higher commercial advantage, and when, as petrol largely sets the price, the recovery of benzole will become more profitable.

There are many fundamental questions which require to be satisfactorily answered in connection with benzole; and, as is always the case, as research proceeds mostly every fresh piece of enlightenment unveils other matters which require exploration. We want as early as possible to get to the root of many complicated and puzzling problems, referring, for example, to benzole properties and their effects. Illustration is given in the present report. A further study is made of the formation of resins from unrefined and partially refined benzole; and from this work numerous questions arise directly and indirectly. As the Committee state, the formation of resins is subject to a number of factors each with its own importance, but no deductions of a kind which could be used with any confidence for the guidance of large-scale operations could be drawn until a systematic study has been carried through, in which the operation of each factor in turn is, as far as possible, studied separately, and in combination with other factors. However, distinct advances have been made in this matter; and it is now possible to draw one or two conclusions as indicated in our review. Justified we believe will be the anticipation of important results from the formation of an Engine Tests Sub-Committee, so that trials can be made of a number of benzoles refined in different ways, and with or without inhibitors—"substances which prevent oxidation and resinification act by preventing the initial formation of peroxide," so runs the theory of Moureu and Dufraisse. Thus through the Joint Benzole Committee scientific research and practical experiments are going hand in hand.

Another practical part of the work has regard to the comparative absorptive efficiencies of washing oils for benzole recovery. It is strange that, benzole recovery having received so much prominence in the coal carbonizing industries during the past decade, no really comprehensive comparison seems to have been made of these oils under the same conditions, and using the same methods and apparatus throughout. It may be readily accepted that such a comparison is an essential preliminary to investigation of possible improvements in the technique of oil washing for benzole recovery. About half of the report is devoted to this subject; and the results of the work, it can be safely predicted, are going to be of immense value in the development of benzole recovery. The work is attracting a large amount of attention, as even those who have been practitioners for many years are agreed that knowledge of these matters requires extension and stabilizing. We have confidence that the work that is being done in this respect by the Joint Research Committee will be closely studied by an ever enlarging number of those engaged in benzole production. The present report substantially amplifies knowledge in this regard; and it should be in the hands of everyone engaged in benzole recovery, or contemplating the extension of operations in that direction.

The report affords complete justification for the acknowledgment by the Joint Committee of the valuable services of their Chairman, Mr. W. G. Adam, B.A. (Oxon.), Mr. W. H. Coleman, F.I.C., and of the Chief Research Chemist, Mr. W. H. Hoffert, M.A., B.Sc. (Oxon.), and the assistant Research Chemist, Mr. G. Claxton, M.Sc. (Leeds). There is an intimation in the report that Prof. J. W. Cobb (Joint Hon. Secretary of the Committee with Mr. P. G. Somerville) will be pleased to receive criticisms or supplementary discussion of the matters contained in the report. Any contributions or response by the Committee will be published in the Technical Press, and also be included in the next annual report. The Committee are anxious that their work shall be rendered, by criticism and suggestion, as complete and conclusive as possible. It is excellent and fertile ground upon which they are working; and the desire is that the maximum advantage shall issue from it for both benzole producers and users.

## "A.G.A." Gas Testing and Research Laboratory.

THE American Gas Association are making great headway with their work of ensuring the quality, efficiency, and safety of the gas appliances supplied in the United States. With admiration, we have frequently called attention to the operations of the testing laboratory since its establishment in May, 1925. It may be thought that, in addition to giving our friends in America praise for what is being done by them in this direction, we had the ulterior motive of using the example as a worthy suggestion. Those who so think need not trouble to discharge the idea from their minds; for the work that is being carried on will ensure not only good attributes in the certified appliances, but unfailingly will educate the people up to the view that the only gas-consuming appliances that should be used are those which have, by critical examination, gained the approval of the laboratory. Nothing better could be done to clear the market of undesirables. Both results are a considerable advantage. However, the original laboratory was only a temporary institution, and was more or less intended to try-out the scheme, to prove its value or otherwise, to gain experience in organization and methods, and so forth. It has served these purposes beyond expectation; and the knowledge to-day far transcends that of May, 1925. The fact that the Association are now spending $150,000 on building a permanent testing laboratory at Cleveland, Ohio, in order to enlarge the scope of the work, requires no added statement to attest the satisfaction of all concerned with what has been accomplished by the Managing Committee of the Laboratory (the Chairman of which is Mr. R. W. Gallagher) and by Mr. Conner, the Director, and his staff. In other words, the new laboratory is the issue of the success of the trial. The reproduction (which we publish to-day) of the drawing portraying the building as it will be conveys to us something of which the American gas industry will be proud. Its very appearance stands for permanence and actuality. It will make available for testing and research work no less than 30,000 sq. ft. of floor space, as against 12,000 sq. ft. in the temporary quarters, in which some 7300 appliances have been tested, and in many critical ways, in order to cover their diverse operations and to prove security. Only those that could pass every conceivable test have been certificated. The corner-stone of the new laboratory was laid in the middle of March by Col. Oscar H. Fogg, the President of the American Gas Association; and it was fitting that this duty should have fallen upon him, inasmuch as he was at one time the leading spirit in the propaganda work of the American Gas Association. How the laboratory appeals to gas companies and manufacturers was

emphasized during the ceremony, and some striking words of Col. Fogg were: "From small beginnings, an "institution has been evolved which is now recognized "throughout the land for its efficiency, combined with "fairness and integrity. It has been a constructive force "in elevating the standards of quality and safety of the "gas appliances used in the homes of America." The gas industry of America has now on its service mains more than 70 million persons. Another notable remark which the President made at a luncheon following the ceremony was: "It is not sufficient that we should dis-"tribute a product that measures up to the highest stan-"dards. In obedience to the best traditions of public "service, it is necessary that the appliances for the utiliza-"tion of our product should be made safe and efficient, "and that the entire chain of service in all departments "should be linked together according to standards." We congratulate the American Gas Association on this development of a branch of work—testing and research—which is so highly beneficial, and send them our best wishes for a continued rich success.

## The Keenness of Current Competition.

In the old days of the industry, the gas manager had no competition to meet worth speaking of other than from inefficient oil-lamps and candles; the open flame gas light being then the newest and most fashionable thing. To have their houses piped for gas lighting was a sign of prosperity among members of the middle and working classes; and the type of chandelier in the drawing room and dining room or parlour was regarded as an indication of the degree of individual prosperity. Those were the times when the gas manager did little in the way of seeking business; those were armchair days when he waited for business to turn up. Things have vastly changed. We have competition to meet on every hand—not one of our commodities is free from it; and, as the years pass, the competition becomes keener. The fact remains that the years of keenest competition for the gas industry have been the ones of greatest business expansion. But they have also been the years of the largest extension in our business-getting activities and methods. We have grown more and more commercial, and yet more scientific. The two have to go together. Those things which were long ago applied to other businesses, but to which in his freedom from competition the old-time manager never gave even a passing thought, have been adopted in our industry, have had their day, and have receded into the background; and in their place have arisen modern scientific modes and organization for business cultivation, and competition is now met with an acuteness and by means which were not thought of in the days of yore.

The extent to which this has happened, and the principles which now govern our commercial doings, were well presented by Mr. W. M. Mason, Manager of the British Commercial Gas Association, in the address he delivered to the Western District of the Scottish Junior Gas Association, and from which we published some extracts last week. In it Mr. Mason shows how there has grown up in the gas industry the recognition of an inseparable partnership between the manufacturing and the commercial sides of the operations of a gas undertaking—how each is dependent upon the other for its pace in progress. But the manufacturing side has not to meet competition; its objective is to work with the greatest degree of economy and efficiency which modern invention and knowledge will enable it to do, with the view of placing in the hands of the commercial side gas at the lowest attainable cost. Mr. Mason in his address says that "competition is often a stimulant." Those engaged officially in the work of gas making properly pay attention to costs and efficiencies. We incline to the view, however, that if the technical officers had a more intimate knowledge of the keenness of the competition that their colleagues at the sales end have to meet, it would be a still greater spur to watch for every opportunity to effect any possible economy. The Chief's knowledge of these matters is not always that of his technical staff, simply because of the want of contact. In our opinion, it would be a good thing if the technical staffs knew more of the activities, difficulties, and successes of those engaged in the sale of the commodity they produce, and if the latter had opportunities for obtaining a general knowledge of the work of the technical staff.

In the same part of his address, Mr. Mason points out that "gas as gas is not wanted by the consumer. It is light, heat, or power that the public need, and are prepared to pay for; and in the supply of these services we have now to meet keen competition." In a tabulated statement, he mentions the quality (may we call it?) of competition in the realms of lighting, heating, cooking, and power, which a manager in the West Riding reports that he has to encounter. Of course, the quality of competition under each head will vary with the circumstances of a locality; many obvious factors will alter it. The table tells us that, in respect of light, our West Riding friend finds the competition of electricity "very keen;" while that of oil and candles is "negligible." If we look at the annual statistics for oil imports, we see that illuminating oil is brought into the country to the extent of nearly 900 million gallons a year. This shows that whatever is the success of our West Riding friend, oil cannot be by any means a negligible factor in some parts of the country. Then in regard to heating, competition of coal with gas is reported as "exceedingly keen," coke competition is "keen," patent fuel and oil "fairly keen," but electricity is "unimportant." Those statements produce certain reflections. The coal merchants are busy preparing their campaign for "popularizing" the use of coal, which shows that they are feeling fairly universally the keenness of the competition of gas. We must not forget too that while—to our credit—gas is competing with the coal merchants in every possible way, they have also to meet the competition of not only gas coke, but the domestic coke produced by the coke-oven industry. The same source enables our West Riding friend to speak of the competition of coke with his like product as being "keen." In cooking we see that the competition of coal and gas is "very keen," while that of oil and electricity is "unimportant." There we have an effect of locality; coal being a local product. In respect of power, the competition of coal, electricity, coke, and oil is stated to be "very keen." That, too, is understandable.

The statement is illustrative of how enormous has been the change in competition with gas (and also with our other products); and yet there is nothing much of which we can legitimately complain, so far as competitors are concerned who are free from statutory restriction. But we do complain that one imposing competitor should have been favoured in an extraordinary degree by our legislators, in which respect, however, the only thing we envy is the Government propaganda on its behalf—not its methods of internal interference with its operations. To that we have to add the attitude of local governing bodies to private gas enterprise where municipal trading in electricity obtains. However, the gas industry as a whole is not depressed by competition. It has done much to enliven it, to the advantage of prosperity, and to the creation of what Mr. Mason describes as "the new spirit and outlook which permeate it." With this new spirit and outlook, the future is faced with great confidence that the expansion of the industry and its service will grow at probably even more rapid rate than has been experienced in the past. But achievement in this regard means the exercise of maximum talent, and to fullness all rational and effective propaganda methods.

### The Charter and Cardiff.

The terms of the Petition, Charter, and By-Laws of the Institution of Gas Engineers are ready for submitting to H.M. Privy Council. It is hoped that the First Annual Meeting under the Royal Charter will be held at Cardiff, under the presidency of Mr. H. Dacre Madden, M.Inst.C.E., M.I.Mech.E., which opens on June 12, on which day H.R.H. the Prince of Wales, First Hon. Life Member of the Chartered Institution, will be visiting Cardiff to unveil the Welsh National War Memorial. The Lord Mayor of Cardiff and the President of the Institution will meet the Prince at the Railway Station on his arrival.

### Long-Distance Gas Supply in Germany.

The Lubeck correspondent of "The Times" states that the long-distance gas-supply scheme is making "rapid progress." He admits the important opposition that there is against the plans of the coke-oven interests; but he says that one city after the other is being persuaded by cheapness to accept a supply. The information is repeated that, on behalf of the whole province of Hanover, a contract has been signed with the Kohleverwertung A.G. Essen providing for the supply from the Ruhr in 1929 of all gas needed for commercial and domestic requirements—the distance to be covered being from 250 to 350 miles.

### Smokeless Fuel for Dwelling-Houses.

Information has been published that the Hull Corporation have decided to build 2600 houses fitted with stoves designed to burn solid smokeless fuel. The type of stove that is to be installed will afford the necessary draught which solid smokeless fuel occasionally needs, but it may be used equally well for raw coal; decision is therefore a matter of the tenant's personal choice. The Manchester Corporation Housing Committee have fitted in their houses grates which will burn coal, coke, or any kind of smokeless fuel on the market; but this is an open grate, while the appliance that has been adopted in Hull is a stove or closed fire. Glasgow, too, has been a pioneer in smoke abatement; and the British Commercial Gas Association have shown that in no fewer than 9219 out of 9868 new houses built in that city under local authority or private housing schemes are fitted with gas cookers and gas washcoppers. Gas is also used to a large extent in municipal houses in Liverpool, Bristol, and Newport (Mon.); also in the London County Council housing schemes—in fact, there is hardly a gas-supply area in the country that cannot show good application of gas in the houses which have been constructed under municipal schemes other than in those districts where electricity has been favoured owing to municipal ownership and trading. It might be mentioned that, although private dwelling-houses were excluded from the provisions of the Public Health (Smoke Abatement) Act, 1926, the Ministry of Health have encouraged the installation in houses built by local authorities of methods of heating and cooking which will prevent or reduce the emission of smoke.

### The Transport Services.

It is understood that the Joint Committee of the two Houses of Parliament will commence their investigation of the Railway (Road Transport) Bills on April 26. Touching the same matter, the Government have promised to hold an inquiry into the transport services of the country generally, and the problem of co-ordination. For this purpose, it is probable that a Royal Commission will be appointed; but it is unlikely that any move will be made in this direction until the Railway Bills have been fully considered by Parliament.

### To Finance and Develop Industry.

What we are coming to in the way of financial and commercial combinations it is difficult to foresee, but another enormous development was announced in the newspapers last week. It is referred to as one of the most remarkable enterprises in the history of finance. It is an Anglo-American combine, whose ambition is to develop industries in any part of the world where opportunities are offered. It is to be known as the Finance Company of Great Britain and America, Ltd., and has been registered with a nominal capital of £2,040,000; but no issue is to be made to the public. In Great Britain the principal will be Imperial Chemical Industries, Ltd., and in America the Chase Securities Corporation of New York. Sir Alfred Mond, head of Imperial Chemical Industries, will be the Chairman, and Sir Harry McGowan the Deputy-Chairman. Sir Alfred states that the amount of money behind this new enterprise is practically limitless, and there is no boundary to the nature of their enterprise. He also mentions that the new organization may lead to co-operation with financiers in Germany and other European countries. The papers are picturing all sorts of schemes that will be taken in hand by this remarkable organization. Among them we see a scheme for the amalgamation of leading British iron and steel firms into one large combine. We also read that the erection of a chain of large plants for the distillation of oil from coal is another development for which plans are being laid by the combine. This latter would have a not distant connection with smokeless fuel.

### Greater Efficiency in Coal Output.

Mr. Philip Gee calls attention to a very interesting point. The output of coal for the last week in March, 1925, was 5,261,900 tons; and the number of workers, 1,122,700. In the corresponding week in 1926 the quantity raised was 5,413,900 tons; the number of workers being 1,111,900. In the same week of 1927, the amount was 5,184,700 tons, with 1,024,600 workers. But in the corresponding week of this year, the quantity produced was 5,270,400 tons, with 950,000 workers. The average production per worker in the last week in March, 1925, was 4·68 tons; in the last week of March this year, 5·54 tons—a difference per worker of 0·86 ton. This shows an improvement in output efficiency; and increased efficiency must always mean the employment of fewer men for an equivalent output. It is evident that, to improve the conditions of the coal industry, it is necessary to produce coal at the lowest possible cost per ton, and, by doing so, full-time employment can be given to the miners who are at work. If more miners were employed to do the same work, it would mean an increase of the cost of production, which would so weaken the competitive position of the industry that markets would be lost, and the number of men employed would automatically recede. The Labour party look at the matter from a totally different angle, and that the wrong one. They believe in employing as many men as possible by reducing the production per man. That, of course, is a most effective way of gradually lessening the capacity of the industry for employment. The industry must be built-up to enable it to give more employment, and the basis of building up must be cheap coal.

### A Menace for Political Independence.

Things are coming to a pretty pass. It seems that those who prefer a trade union run on non-political and purely industrial principles are traitors to the workers of the world; while to deprive by organization a man of his political freedom is not regarded as an offence. Mr. G. A. Spencer, M.P., Mr. Gascoyne, and Mr. J. G. Hancock, the principal officers in the Miners' Industrial Union, have received a missive, signed by "The Gunmen on the Move," which informs them in effect that their work in this life will be ended, if they do not cease their "treacherous actions and betrayals." We wonder what the General Council of the "T.U.C." think of this support for their interference with the Notts miners' non-political Union. Of course, it is said that the communication has been sent from an irresponsible source, but it is not going to be altogether disregarded by our guardians of the peace. We hope there will be success in tracing the senders; there are suitable places for the housing of those who threaten such mischief.

### Unemployment Shrinking.

Employment last month further improved. The total number of persons on the registers of the employment exchanges in Great Britain on March 5 totalled 1,094,500; March 12, 1,071,700; March 19, 1,066,100; March 26, 1,033,800; and April 2, 1,041,900. The difference, therefore, between March 5 and April 2 was the favourable one of 52,600. It will be observed that there was an increase of 8055 between March 26 and April 2. This was brought about by temporary stoppages, which numbered about 10,000; those totally unemployed showing a decrease of something like 1700.

**Society of Chemical Industry.**—A conference of the Society will be held in London from May 11 to 15, organized by the Society in co-operation with its London Section and Chemical Engineering Group of the Institution of Chemical Engineers. On May 14, the meeting will take place at the Institution of Civil Engineers, when, among others, the following addresses will be presented: "The Fuel Industries and the Work of the Chemical Engineer," by Sir Arthur Duckham, K.C.B.; and "The Chemical Study of Low-Temperature Tar," by Prof. G. T. Morgan, F.R.S.

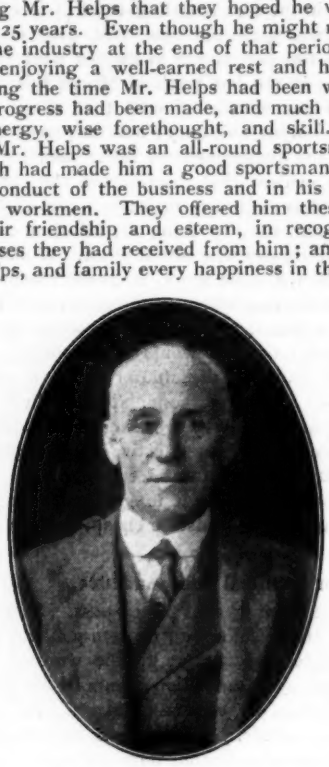
# PERSONAL.

## PRESENTATION TO MR. D. H. HELPS.

### Twenty-Five Years with the Reading Gas Company.

At the Reading Gas-Works, on April 3, there was an interesting ceremony, when the staff and workmen of the Engineer and Manager's Department assembled in the messroom at the gas-works to present Mr. D. H. Helps (Engineer and Manager) with a silver cigarette box and a rose-bowl on the occasion of his completion of 25 years' service with the Company. The esteem and regard in which Mr. Helps is held by the employees was evidenced by the large number who attended.

Mr. L. A. Rumble said they had met together to honour their Chief. They felt they could not let the occasion pass without telling Mr. Helps that they hoped he would be with them another 25 years. Even though he might not be actively engaged in the industry at the end of that period, they hoped he would be enjoying a well-earned rest and his usual good health. During the time Mr. Helps had been with the Company, great progress had been made, and much of it had been due to his energy, wise forethought, and skill. As most of them knew, Mr. Helps was an all-round sportsman; and the qualities which had made him a good sportsman had been applied in the conduct of the business and in his dealings with the staff and workmen. They offered him these very slight tokens of their friendship and esteem, in recognition of the many kindnesses they had received from him; and they wished him, Mrs. Helps, and family every happiness in the future. He



Mr. Douglas H. Helps.

had been associated with Mr. Helps for the past 20 years; and he never wished to have a better Chief.

Mr. C. H. Eves said he would like to indulge in a few reminiscences, having known Mr. Helps for a longer period than any person present. On the day that Mr. Helps was appointed to Reading—25 years ago—he met the late Mr. John Egginton, then one of the Directors of the Company; and he remarked, "Well, Mr. Eves, you will be interested to learn that we have appointed Mr. Helps, of Redhill, as Engineer and Manager of the Reading Gas Company; and I think we have chosen the right man." He (Mr. Eves) replied: "Well, sir, if he proves to be half as good a man as his father, I believe you are right." As to how far Mr. Egginton's prophecy had been fulfilled, was shown by the position of the Company to-day. The Reading Gas Company was, as they knew, regarded as one of the most progressive and up-to-date provincial undertakings in the kingdom. The name of Helps had been an honoured one in the gas industry for well over 70 years. A remarkable coincidence was that just 26 years ago he (the speaker) was one of a privileged number to be invited to Bath by the Directors of the Bath Gas Company, to do honour to Mr. Helps's father, who was retiring after 50 years' service with that Company. He ventured to say that his father's name had been worthily upheld by their present Chief, who was honoured and respected in the industry. Mr. Helps to-day was legislating for gas consumption over the next 25 years; and it was their sincere hope that at the expiration of that period he would be—even though not actively engaged among them—watching with interest the success of the undertaking. He would have the satisfaction of knowing that his plans were wisely laid for a vast expansion in the consumption of gas in Reading.

Messrs. T. Elliott (49 years' service) and J. Woodley (41 years' service) then handed to Mr. Helps a silver rose bowl and cigarette box on behalf of the staff and workmen. The cigarette box bore the following inscription: "Presented to Douglas H. Helps, Esq., A.M.I.C.E., by the employees of the Reading Gas Company, as a token of esteem, and to commemorate his completion of 25 years as Engineer and Manager."

Mr. Helps said he appreciated very much all that had been said, and thanked them sincerely for the gifts—and more particularly for the kind thought which had prompted them. The gifts would be a memento of the happy time he had spent among them. The time had passed very rapidly in cultivating a demand for gas, and then, having cultivated it, in meeting that demand. Since he came to Reading in 1903, the sales of gas had increased from 444,877,800 to 1,196,630,700 c.ft., the mileage of mains from 80 to 160, and the number of consumers from 9756 to 25,567. He would like to thank them all most sincerely for their valuable help and loyal support. He was particularly pleased to see so many employees present who were in the service of the Company when he came to Reading. These gifts would be added to other mementoes of his association with the gas industry—namely, one which the employees of the Croydon Gas Company had given him when he left Croydon many years ago, and another from the employees of the Redhill Gas Company, which he had received on the occasion of his marriage. He presumed that the silver rose-bowl was for Mrs. Helps, and he could assure them that she would be as delighted as he was to receive the gifts.

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## FAREWELL PRESENTATION AT EAST GRINSTEAD.

### Mr. D. T. Livesey's Long Service.

There was a memorable gathering of the employees of the East Grinstead Gas and Water Company at the British Legion Hall, East Grinstead, on April 6. It was the occasion of a formal farewell to Mr. D. T. Livesey, who has retired from the offices of Engineer, Manager, and Secretary after 34 years' service.

Mr. D. W. Lockey (Deputy-Manager) spoke of the courage which Mr. Livesey had displayed throughout the whole of his career, and expressed pleasure that Mr. Livesey would still be associated with the Company as Managing-Director. Some of those present had served under him for 32 years.

Mr. G. Cooper, the senior employee of the Company, then handed to Mr. Livesey a handsome clock, and an illuminated address signed by all the employees. The address read:

> Presented to Mr. D. T. Livesey by the staff and workmen of the East Grinstead Gas and Water Company on the occasion of his retirement from active management of the Company's works, as a token of their respect and regard for him and in appreciation of his many valued years of successful management. The best wishes of the undersigned go with the accompanying memento for the future health and happiness of Mr. and Mrs. Livesey.

Mr. Livesey, in returning thanks, said that the party present represented 564 years of service to the Company, an average of 11 years' service each. He thanked them for their gifts, which would always be treasured.

Mr. W. H. Hills (Chairman of Directors) added a few words in appreciation of Mr. Livesey's long and faithful services, and he assured the employees that while Mr. Livesey had always had the interests of the Company at heart, he had ever been solicitous for the welfare of its workpeople. He felt sure they would find in his successor a kindly, courteous gentleman, who would be anxious to see that the present happy relationships continued.

Mr. J. Hyde, the new Manager, said that what he had seen and heard was an indication to him of the very happy relationship which existed, and he trusted it would continue.

Every employee then received from Mr. Livesey an envelope containing coins, which represented the number of years each had served.

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On May 31 Mr. Alexander Smith, Manager at the Tradeston Gas-Works of the Glasgow Corporation, will retire, after forty years' service with the Gas Department; and the Corporation have placed on record their high appreciation of his work. Educated in Aberdeen, Mr. Smith, in 1879, commenced a five years' apprenticeship as engineer with Messrs. Blaikie Brothers, of that town. On the termination of this, he was engaged at the Aberdeen Gas-Works as draughtsman. In 1887 he entered the service of the Glasgow Gas Department, and for a year was at the Dawsholm Gas-Works. In the following year, however, he was transferred to the drawing office; and later in 1888 he took charge of reconstruction and extensions at the Tradeston Works, where he remained till 1891. From that time till 1904, when he was appointed Station Manager at the Tradeston Works, he was engaged on various interesting extensions.

Mr. J. Watson Napier has gained the Degree of B.Sc. (Hons.) in Chemical Engineering at the Glasgow University. Chemical engineering is a new course at the University, and Mr. Napier, who is the son of Mr. J. W. Napier, the Gas Engineer at Alloa, is the first student to obtain the Degree.

# ELECTRICITY SUPPLY MEMORANDA.

Our electrical contemporaries are past-masters at telling their readers all about the installation of electrical appliances in cafés and such-like places; but they never revert to the subject when gas and coke heated appliances are introduced to make up for the deficiencies of the electrically operated fitments. There has been frequent experience of this kind. We recently read in the "Electrical Times" of the electric cafés of the Burslem and District Industrial Co-operative Society. Their first electric café was opened in Burslem in August, 1926; and similar equipment was put into their café in Stoke-on-Trent in December last year. The electricity consumption and cost over the first year's operation at Burslem was 16,842 units at 1d. (£70 17s. 10d.) and 19,801 units at ½d. (£42 10s.), or 36,643 units in all, costing £113 7s. 10d. After the Burslem electric café was opened, there was a request for gas appliances, and three gas cookers, two fires, and two Ewart "Ever-Ready" gas boilers were fixed. That is a little incident of which our contemporary had no information, or omitted to mention—of course, quite accidentally. The gas consumption at the café ranges from 50,000 to 70,000 c.ft. per quarter. Take the mean figure, and apply it to all four quarters of the year, that would make 240,000 c.ft. per annum. At 470 B.Th.U. per c.ft., that is 1128 therms. The 36,643 units are equivalent to 1250·25 therms; and they cost £113 7s. 10d. at 1d. and ½d. per unit, or an average of 0·742d. per unit. Even at that low price, an electrical therm costs 1s. 9½d. To produce anything like £113, the 1128 gaseous therms would have to be sold at 2s. each! And they are not. Only the electrical therms, at an average of 0·74d. per unit, approach anywhere near that figure per therm. Would it surprise the "Electrical Times" to learn that at the new café at Stoke-on-Trent there are two gas cookers, one gas-geyser, and one gas-fire? Our electrical friends are constantly trying to get cheap advertisements in this fashion; but when the position is fully investigated, it is often found that gas has to bear the major part of the burden of work. But it does it with greater reliability, and at lower installation and running costs. To maintain honestly the right to the title of "electric" café costs money, the payment of which many proprietors do not care to continue long.

**Gas-Aided Electric Cafés.**

In the "Memoranda" for March 14, a lecture was noticed which Mr. W. J. Foster had delivered to the Birmingham Electric Club. The lecturer's outspoken views have arrested the attention of "Hotspot" in the "Electrical Times." He does not agree with Mr. Foster's condemnation of the practice of sending out small radiators of about 600 watt loading, fitted with an adaptor for use off an ordinary lamp holder, though he admits that a socket and plug connection is much safer and more reliable. But "Hotspot" considers that to abandon the bayonet cap adaptor for small current consuming appliances would, at the present time, be most inexpedient. He argues that were it not for the fact that bowl type radiators, vacuum cleaners, toasters, irons, &c., can be bought and used off existing lamp circuits, consumers could not so readily gain practical experience of the convenience and economy of electricity for purposes other than lighting. "It is," he adds, "on the basis of such experience that the comparatively heavy cost of larger apparatus and special wiring is seen to be a sound investment." The reasoning of "Hotspot" is not good. It is not economical or expedient to use for such purposes electric current at lighting rates. We would remind him of the complaints that have been made of electric-lighting accounts, which the accumulation of the demands of these ravenous minor appliances go to swell, and so help to create discontent, which is the exact opposite to the economy effect of which "Hotspot" speaks. Mr. Foster is opposed to radiators being hired out by supply authorities, seeing that their prices are to-day within the reach of all. But "Hotspot" holds that as gas-heating appliances can be obtained on hire, similar facilities must be provided for electric fires.

**Encouraging "Other Uses" at Lighting Rates!**

On the subject of electric cooking, "Hotspot" makes some confessions. The business is not sufficiently large yet for mass production; and he does not encourage Mr. Foster in its advocacy by the use of pressed steel. It may be taken for granted that, if the experienced manufacturers of electric cookers were of opinion that they could do better by using pressed steel parts than by castings, they would have adopted the process. It must not be forgotten, too, that pressed steel construction has to be considered in relation to radiation losses, which electrical operation, through the dearness of the B.Th.U.'s, can ill afford. "Hotspot" points out, too, that the requisite machinery would involve a heavy capital outlay, and justification for this would not be found in a smaller output than 100,000 per annum. Seeing that there are half-a-dozen leading electric cooker firms, he says it is evident they would have to produce something over half-a-million cookers per annum. But "the existing market is incapable of absorbing more than a fraction of this aggregate output, and the individual concern may well hesitate to initiate a move that might lead to general chaos and bankruptcy of itself as well as others. Putting the matter briefly, the electric cooker business is not yet capable of supporting really large scale mass production by even a very few manufacturing concerns." The reasons for this are not stated. It is also admitted that, taking all factors into consideration, the existing level of electric cooker prices is not high. It is said that necessarily they are more expensive than gas-stoves, as their manufacture involves more costly materials, and far more skilled labour. Actually *ex*-works cost of an electric cooker is roughly 50 p.ct. materials and 50 p.ct. labour.

**Difficulties of the Electric Cooker.**

"Hotspot" agrees with Mr. Foster that water heating by electricity "on a cheap and reasonable tariff" has only one formidable rival—the coke-boiler. That depends on the cash represented by the vague words "cheap and reasonable tariff." He would go still further, and qualify the remark to the effect that the coke-boiler is only comparable with an electric installation on the score of cheapness. "It does not and cannot give a continuously available hot water supply day and night all the year round—without any trouble or attention—that is possible with electric water heating." The little "trouble and attention" is worth giving when the enormously superior volume of hot water always available is considered. The limitations of electricity in this important household service is the subject of ridicule in not a few households where the electric heating of water has been tried, and its "convenience" found very much wanting. The jocular remark: "Whose turn is it to have a bath to-day?" has been heard more than once. With a coke or gas heated boiler or a gas geyser, as many people can have a bath as may desire, and as the time taken by the individual will allow. With electricity, it is not the individual but the process of heating the water that governs the number of baths that may be taken in a given time. We should advise "Hotspot" not to talk too much of the shortcomings of a coke-boiler installation compared with an electric installation. And he is talking "through his hat" when he says: "Broadly speaking, electricity for water heating gives unrivalled service at an economic price; and there is in this direction an enormous field of development unfettered by serious competition." Why is it that water heating by gas and coke is advancing by leaps and bounds, and the electric heating of water is dragging wearily along far in the rear, so much so that it is difficult to observe it? Perhaps our friend omitted to explain this on account of the pressure on his space.

**Water Heating.**

During the past twelve months, many buyers of electrical plant have protested against the prices quoted by British manufacturers, and have carried their resentment to the length of placing their orders with foreign makers. To the individual undertaking there is a distinct capital saving; to the country a loss, other than that there is the plant in hand at a lower capital expenditure upon which interest and sinking fund charges have to be paid. There cannot be this constant trouble without some cause for it. The British manufacturers attribute it to higher labour costs, heavier rates and taxes, and so forth; and up to a point there is unquestionably truth in this. But do these things account for a difference of nearly 43 p.ct. between a Belgian tender of £5650 for a 2500-kw. motor converter, and the nearest price of close upon £8000 submitted by a British manufacturer? That is a question that it would be well to have answered, because when we see the Manchester City Council—constituted as it is of so many business men—accepting this particular Belgian contract by "an overwhelming majority," it gives one cause for wonder. We are every time in favour of home productions for home use; but not if prices are of a fictitious or unfair order. And it is for the British electrical manufacturers to prove they are not unfair, having regard to their heavier costs. Alderman Dagnall, at the meeting of the Manchester City Council, at which the matter was discussed, said that the firm who had supplied a similar converter to the Department asked on this occasion 46 p.ct. more. Sir William Kay and Mr. Councillor Brine were hostile to giving the contract to the Belgian firm, in view of the low wages paid in Belgium, and the amount of unemployment in this country. But the protection of the interests of the ratepayers, and the necessity for giving a gentle hint occasionally to the British electrical manufacturers, were considered sufficient reasons for agreeing with the recommendation of the Electricity Committee.

**Plant from Abroad.**

The informative publication which the Electricity Commissioners annually make of analyses and summaries of the returns of fuel consumption and units generated in Great Britain, has been issued for the year to

**Fuel Consumption and Thermal Efficiencies.**

March 31, 1927. Owing to the general strike, and the stoppage of the coal industry, the results have in some measure been affected; but there can be congratulation to the responsible electrical engineers upon the fact that, despite the inferior characteristics of some of the coal they had to use, and the unusual types from abroad, they were able to come out of the extraordinary year with data not strikingly incomparable with those of the year before. During the year, 26 stations ceased working, but 12 others entered into active operation, and thus the net number dealt with—570—was only 14 less than in the previous year. The total quantity of electricity generated by these stations was 8,365,857,198 KW.H.—an increase of less than 3 p.ct. On the other hand, the fuel consumed amounted to 8,856,938 tons, which was an increase of 4·8 p.ct. In steam stations, the average fuel consumption was raised from 2·4 to 2·43 lbs. per KW.H. The stations are grouped according to outputs. In Group A (generating upwards of 200 million units per annum), the average result was 2·06 lbs. Group B, dealing with stations between 100 and 200 million units, gave an average of 2·08 lbs.; and Groups C, D, and E (10 to 25 millions), an average of rather below 3 lbs. The groups so far mentioned supply upwards of 90 p.ct. of the total output. It is only in the small stations where consumptions are found rising to such figures as 13 or 14 lbs. per unit; and these produce less than 100,000 KW.H. per annum.

**Some Details.**

The Barton Station of the Manchester Corporation takes the palm for the lowest fuel consumption. It managed to descend to an average of 1·33 lbs., as compared with 1·36 lbs. for the preceding year. The output of the station amounted to 300,771,400 units; the thermal efficiency was 21·83 p.ct.; and the station load factor was 53·2 p.ct. The Grove Road Station of the London Power Company, Ltd., claims the next position, with 1·71 lbs., as against 1·81 lbs. for the previous year. The station accounted for 133,388,110 units; the thermal efficiency was 17·9 p.ct.; and the load factor was 24·2 p.ct. The Lancashire Electric Power Company at their Radcliffe Station used 1·76 lbs. of fuel per KW.H.; the thermal efficiency being 17·14 p.ct. The Valley Road Station of the Bradford Corporation almost equalled the last-named station with 1·77 lbs. of fuel per unit. The position occupied in the preceding year by the North Tees Power Station of the Newcastle-upon-Tyne Electric Supply Company, Ltd.—second on the list—was, during the year under review, sacrificed by the fuel consumption rising from 1·51 lbs. to 1·86 lbs. per unit. Several other stations can claim consumption figures below 2 lbs.; but we cannot specially name them all here. In Group A—the stations with outputs exceeding 200 million units per annum—there are seven stations with an average fuel consumption of 2·06 lbs.; and they generated a total of 1,653,870,334 units. In group B (stations producing 100 to 200 KW.H.) eleven stations had an average fuel consumption of 2·08 lbs.; the quantity of current generated being 1,579,361,162 KW.H. In Group C (50 to 100 million KW.H.) and Group D (25 to 50 million KW.H.), we find the fuel consumptions are respectively 2·27 lbs. and 2·53 lbs.; the relative outputs being 1,792,092,583 KW.H. and 1,583,167,698 KW.H. In the group of oil-driven stations, the lowest fuel figure was 0·62 lb. for the Alderley and Wilmslow Electric Supply Company—the thermal efficiency being 27·91 p.ct., with a total output of 671,094 units, and a load factor of 17·2 p.ct. In 111 oil-driven stations, the total production was 65·5 million units; the average fuel consumption being 1·1 lbs. per KW.H. In the gas producer stations, the lowest fuel consumption was 1·73 lbs. of coal per KW.H.; this being at the station of the Guernsey Electric Light and Power Company, Ltd. The output was 3,206,255 units; the thermal efficiency being 16 p.ct., with a load factor of 23·2 p.ct. Only about 20 million units were generated by 56 gas-producer stations, with an average fuel consumption of 2·47 lbs. per KW.H. Some 3 million units were generated by 25 stations using town gas; while 17 stations employing waste heat generated 78 million units.

**Mishaps.**

On Monday, April 2, the Orient Express from Zurich caught fire, and had to be stopped at Flums Station. A newspaper report states that a short circuit apparently caused the outbreak. The passengers in one compartment escaped with difficulty, but lost their baggage. The coach in which the fire originated was destroyed; and the flames reached the luggage and restaurant cars. The electric current on the train failed, and caused the detention of the train. Mr. G. H. Franklin, an Engineer at the Leicester Corporation Electric Power Station, was killed on the 2nd inst. He entered a high-tension cubicle without, it is stated, first turning-off the current. Apparently he came in contact with a live connection; death being instantaneous. There have been a little crop of street explosions due to the misbehaviour of electric cables. One occurred, on Tuesday of last week, in an electrical inspection box of the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board. Through it several cotton mills and other works were rendered temporarily inoperative and the village of Greenfield was destitute of current. The inspection box is at the junction of High Street and Brougham Street, Stalybridge. Black smoke was seen issuing from it, and then part of the pavement was blown up and flames shot to a height of several yards. It was found that the cable had been burned away for a length of about 18 in.; and the molten metal was found lying in the bottom of the box. The explanation is that the explosion was caused by a short circuit at the Mossley sub-station, which created faults both there and at other places on this line of cable. Last Wednesday part of the pavement in front of the Coliseum Cinema in Ardwick Green, Manchester, was blown up, and 20 ft. pillar of flame followed from an underground electric main. There was a similar occurrence on Tuesday of last week at Barnsley. An electric cable in Wellington Street fused shortly before 8 o'clock, and the pavement flags were blown up and flames appeared. The electricity supply failed within a radius of about 250 yards. Among the premises affected were the Theatre Royal and the Salvation Army Citadel.

## FORTHCOMING ENGAGEMENTS.

**April 21.**—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Annual meeting at Newport.

**April 24.**—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at Tunbridge Wells.

**April 25.**—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Derbyshire Silica Fire Brick Company, Ltd., Friden.

**April 28.**—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Apedale Pits of the Midland Coal, Coke, and Iron Company, Ltd.

**May 3.**—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General meeting at Tredegar (Mon.).

**May 4.**—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Annual general meeting in Newcastle, 2.15. Papers by Mr. L. H. Sensicle ("Recovery Methods and the Ammonia Problem") and Mr. W. L. Robertshaw ("Notes on the Design, Maintenance, and Working of Coal and Coke Handling Plants").

**May 8.**—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Committee.

**May 8.**—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

**May 9.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Midlands District at Redditch.

**May 11-15.**—SOCIETY OF CHEMICAL INDUSTRY.—Conference in London, organized by the Society in co-operation with its London Section and Chemical Engineering Group and the Institution of Chemical Engineers.

**May 16.**—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

**May 16-17.**—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Meeting at Bedford.

**May 17.**—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual general meeting at the Hotel Cecil, W.C. 1, under the presidency of His Grace the Duke of Sutherland.

**May 18.**—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the works of the Rochester, Chatham, and Gillingham Gas Company.

**May 22.**—CENTRAL COMMITTEE OF THE FEDERATION OF GAS EMPLOYERS.—Meeting at the Hotel Cecil, 10.30.

**May 22.**—CENTRAL EXECUTIVE BOARD OF THE NATIONAL GAS COUNCIL.—Meeting at Hotel Cecil, 11 o'clock.

**May 22.**—FEDERATION OF GAS EMPLOYERS.—Annual general meeting at the Hotel Cecil, 2.15.

**May 22.**—NATIONAL GAS COUNCIL.—Annual general meeting at the Hotel Cecil, 3 o'clock.

**May 24.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Cornish District at Truro.

**May 24.**—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Spring general meeting at Willenhall.

THE INSTITUTION OF GAS ENGINEERS.

All meetings take place in the Council Room at 28, Grosvenor Gardens, unless otherwise stated.

**April 28.**—Examination in Gas Engineering and Gas Supply held at centres in England, Wales, and Scotland.

**May 1.**—Refractory Materials Joint Committee.

**May 7.**—Sub-Committee of Gas Investigation Committee, to be held at Leeds University.

**May 8.**—Executive Committee of Gas Education Committee.

**May 22.**—Gas Investigation Committee in morning. Effluents Research Committee in afternoon.

**June 12-15.**—Annual General Meeting at Cardiff.

**July 10.**—Gas Education Committee.

**Oct. 9.**—Gas Education Committee.

**Nov. 13.**—Executive Committee of Gas Education Committee.

**Dec. 11.**—Executive Committee of Gas Education Committee.

## THE INSTITUTION OF GAS ENGINEERS.

From the Secretary of the Institution, Mr. Walter T. Dunn, we have received the following list of members, &c., elected on April 2.

*Members.*

| | |
|---|---|
| BARBOUR, JAMES | Gas-Works, Saltcoats, Ayrshire |
| BARKER, HAROLD | Llanelly Gas Light Company, 1, Greenfield Buildings, Llanelly |
| BYRT, C. E. | 7, Colne Road, Burnley |
| CUTHBERT, A. | Gas-Works House, Dalgrain Rd., Grangemouth |
| HAWORTH, T. | Gas-Works, Ripon |
| KIMPSTER, W. C. | Gas-Works, Bishop's Stortford |
| LINDLEY, G. | 96, Pickford Lane, Dukinfield |
| MCELWEE, F. G. | Abbey Street, Coleraine, Co. Derry |
| MARSHALL, W. | Gas-Works, Largs |
| PENNINGTON, G. | Gas-Works, Sittingbourne |
| SIDAWAY, C. C. | 9, St. Nicholas Street, Droitwich |
| SIMPSON, J. F. | Gas-Works, Dawes Lane, Scunthorpe |

*Associate Members.*

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| BEELEY, T. E. | 64, Cooper Street, St. Helens |
| BENNETT, S. R. | 63, Park View Terrace, Nelson |
| BOYD, J. | Ivy House, Rothesay |
| COLLINS, W. H. | Gas-Works, Spring Gardens, Dudley |
| COOMBS, H. A. | Isis House, Friars Wharf, Oxford |
| CUTHBERT, J. G. | Gas-Works, Airdrie |
| DEAN, S. B. | Gas-Works, Batley |
| DUNCAN, G. J. | Gas-Works, North Shields |
| HALL, J. | 47, Gadie Street, Riddrie, Glasgow |
| HARRISON, W. J. | "Kranz," Springfield Road, Belfast |
| HOLE, S. | 6, Coronation Road, Bath |
| HORNBY, F. | Gas-Works, Normanton |
| HUDSON, G. | Gas-Works, Hessle |
| JONES, S. B. | Gas Offices, Clevedon |
| LOCKHART, T. S. | Gas-Works, Coatbridge |
| MACFARLANE, C. W. C. | Dawsholm Gas-Works, Maryhill, Glasgow |
| MARSLAND, P. | Gas-Works, Longwood, Huddersfield |
| MIELL, L. L. | Commercial Gas Company, Stepney, E. 1 |
| OGLDS, W. E. | 27, Denwick Terrace, Tynemouth |
| QUILLER, W. R. | 11, St. Jude's Place, Plymouth |
| RICHARDSON, B. | 10, Hyde Terrace, Gosforth, Newcastle-on-Tyne |
| ROSE, E. O. | Holly Lodge, Queen Road, Hertford |
| SIMMONS, A. | Gas-Works, Cambuslang |
| SIMMONS, S. W. | Gas-Works, Spring Gardens, Dudley |
| SOAR, E. | 63, Silverdale Road, Nottingham |
| TELFORD, F. | 8, Spark Street, Longwood, Huddersfield |
| WARE, G. C. J. | 22, Tudor Road, Kingston-on-Thames |
| WILLIAMS, A. E. | Grangetown Gas-Works, Cardiff |

*Associate.*

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|---|---|
| WEBB, H. W. | Technical College, Whitehead Road, Ashton, Birmingham |

*Transference.*

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| BENHAM, H. F. | 10, Dallinger Road, Lee, S.E. 12 (Associate Member) |
| EDMONDS, F. J. | Gas-Works, Waterford (Member) |

*Studentship.*

| | |
|---|---|
| ASHMAN, W. L. | 51, Lyncombe Jill, Bath |
| BUTTERFIELD, A. J. W. | 163, Northumberland Park, Tottenham, N. 17 |
| CHILCOTT, J. A. | 3, Walters Road, Llansamlet, Swansea |
| FARNWORTH, E. N. | 7, Hornby Street, Oswaldtwistle |
| FELTHAM, H. C. | 66, Lower Oldfield Park, Bath |
| MATTHEWS, A. E. | Thomas à Becket Hotel, Worthing |
| PARRISS, R. W. S. | 66, Lower Oldfield Park, Bath |
| WARDLE, N. F. D. | 5, Vane Street, Bath |

## EVENING STAR CHAPTER, No. 1719.

### Annual Installation Convocation.

The companions and guests of the Evening Star Chapter, No. 1719, attended in good numbers on Wednesday last at Freemasons' Hall, Great Queen Street, for the annual Installation Convocation.

The principal chairs at the opening of the proceedings were occupied by Ex Comp. Charles Clare (Z.); Ex Comp. Rae P. Normand (H.); and Ex Comp. Walter McDowell (J.), the latter in the regretted absence, through serious illness, of Ex Comp. W. W. Hammond, of Bognor.

After the usual preliminary business had been transacted, the sympathy of the assembled companions was expressed from the chair with respect to the loss which had been sustained by the death of Mrs. Normand (the celebrated artist "Henrietta Rae"), mother of Ex Comp. Normand, and sister-in-law of Ex Comp. William A. Surridge, who has been the respected Treasurer of the Chapter from the date of its consecration. The Z. also made sympathetic reference to the death of Ex Comp. Belton, P.Z. of the Chapter, and a member of Grand Chapter. The company silently rose from their seats in token of their sorrow.

Bro. Stephen Hay, M.M. of the Evening Star Lodge, was duly balloted for and was declared to have been unanimously elected as a candidate for exaltation. Assisting in the ceremony were Ex Comp. Alfred C. Beal, P.Z., as P.S.; Ex Comp. Dommett as Scribe E.; Comp. J. Fred Wicks as Scribe N.; and Comp. Dashwood as A.S.

The ceremony was most impressively performed in every particular, the concluding addresses being given with much dignity of expression by the three Principals mentioned above.

Ex Comp. Surridge presented the report of the Audit Committee for the year 1927-28, which was unanimously accepted and adopted.

Ex Comp. Charles Clare was decorated with a Past-Z. jewel in appreciation of all he had done for the good of the Chapter during his year of office.

The officers for the year 1928-29 were then installed as follows (with the exception of Ex Comp. Hammond, and Comp. G. D. Bidwell).

| | |
|---|---|
| Z. | Ex Comp. Rae P. Normand |
| H. | Ex Comp. Walter McDowell |
| J. | Ex Comp. W. W. Hammond |
| Scribe E. | Ex Comp. Alfred C. Beal, P.Z., P.Z. 2913 |
| Treasurer | Ex Comp. William A. Surridge, P.G.Std.B., P.Z. 1201, 1397, 1719 |
| D.C. | Ex Comp. Charles Hulme |
| Scribe N. | Comp. J. Fred Wicks |
| P.S. | Comp. G. D. Bidwell |
| 1st A.S. | Comp. H. H. Dashwood |
| 2nd A.S. | Comp. Masters |
| Steward | Comp. Belton |

After the Chapter had been closed in regular form until November next, the companions, accompanied by their guests, repaired to the adjoining Connaught Rooms, where they dined together under the presidency of Ex Comp. Rae P. Normand (Z.); Ex Comp. Walter McDowell (H.); and Ex Comp. Dommett (Acting J.).

The usual Royal Arch Chapter toasts were cordially observed; that of "The Exaltee" receiving especial attention. To the toast of "Grand Officers Present and Past," Ex Comp. Surridge adequately responded.

There was an excellent programme of songs and dramatic recital.

## BRITISH COMMERCIAL GAS ASSOCIATION.

### Midlands District Conference at Redditch.

The following is the programme arranged for the "B.C.G.A." Midlands District Conference, which is to be held on May 9. The programme has been arranged with the primary object of stimulating interest in the use of gas for industrial purposes.

**Morning Session.**

11.0 to 11.30 a.m. Assembly at the Church Institute.
Visits to one of the following works:
(*a*) The Enfield Cycle Company, Ltd. (makers of cycles and motor cycles),
or:
(*b*) Henry Milward & Sons, Ltd. (manufacturers of needles),
or:
(*c*) The Gas-Works, Redditch.

1.0 for 1.30 p.m. Luncheon at the Plymouth Hall. (By invitation of the Chairman and Directors of the Redditch Gas Company.)

**Afternoon Session.**

2.30 p.m. Public Conference in the Church Institute.
Opening remarks by the President of the Conference.
Subject for discussion: "Town Gas and Industry."
Paper by H. R. Hems (Industrial Research Laboratories, City of Birmingham Gas Department).
Discussion (open to the public) to be opened by C. F. W. Rendle (Engineer and Manager, Redditch Gas Company).

4.30 p.m. Afternoon tea.

**Evening Session.**

In the Temperance Hall.

7.30 p.m. Address by W. Allen Daley, M.D., B.A., B.Sc. (Medical Officer of Health, Hull), on "Atmospheric Pollution in Relation to Health."

## Our "Carbonization Number."

We very much appreciate a letter which has been received from the Hon. Secretary of the Joint Fuel Committee (Dr. E. W. Smith) regarding the Carbonization Number of the "JOURNAL," which was issued on Feb. 14. The letter is as follows: "The Joint Fuel Committee, at its meeting on March 30, instructed me to write and congratulate you on the extremely efficient way in which you handled the publication of the papers for the Carbonization Conference. If one thing more than another led to the success of the Conference, it was the fact that the papers were in the hands of all who desired them, including the whole of your own subscribers, by the time promised by you—a full week prior to the Conference. As is usual with you, the papers were remarkably free from printers' errors, and showed ample evidence of very careful editorial work. The Committee also very much appreciate the way in which the papers and the discussions were made available to the General Public; and as representing a part of the Fuel Industries, we feel that we are extremely fortunate in having such an efficient available technical Journal."

**Midland Association of Gas Engineers and Managers.**—The Spring General Meeting of this Association will be held at Willenhall on Thursday, May 24.

# NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

## SPRING MEETING IN EDINBURGH.

The Spring Meeting of the North British Association of Gas Managers was held on April 13 in the L. & N.E. Railway (North British) Hotel. Mr. H. H. Gracie, of Edinburgh, the President of the Association, was in the chair, and was supported by Bailie Hay, the Senior Magistrate of the City of Edinburgh; Mr. J. W. Napier, Alloa; Mr. John Wilson, Motherwell and Wishaw; Mr. Jamieson, Assistant Gas Manager, Edinburgh; and Mr. David Fulton, Helensburgh, the Hon. Secretary of the Association.

THE PRESIDENT.
H. H. Gracie, of Edinburgh.

The Senior Magistrate, on behalf of the Lord Provost, welcomed the Association to Edinburgh. The Lord Provost had been looking forward to this visit from the Association, and had intended to be present. Unfortunately he was confined to the house through illness, and he had asked him, as the Senior Magistrate, to deputize for him. The Corporation hoped that the members would thoroughly enjoy their visit to the historic capital of Scotland.

Mr. Gracie briefly acknowledged the greeting from the Corporation of Edinburgh; and the ordinary business of the meeting was commenced.

### The Late Mr. Peter Robertson.

The President said that since the Association's last meeting they had lost, by death, Mr. Peter Robertson, the Editor of the "Gas World." Mr. Robertson, who was a Scotsman, was often present at the meetings of the Association, and had taken a great interest in its activities.

As a tribute to the memory of the deceased, the members stood silently in their places.

### The President's Address.

Mr. Gracie then presented his Address, of which an instalment appears on pp. 169-74.

### Vote of Thanks.

Mr. J. W. Napier (Alloa) asked them to accord to Mr. Gracie their appreciative thanks for his address. The Scottish gas industry was indebted to their President for his interesting and practical survey of the gas undertaking in Edinburgh. The City of Edinburgh had always been progressive and had full reason to feel proud of its public utility services. Edinburgh had been fortunate in its gas managers during the past forty years. There was first Mr. Robert Mitchell, who had occupied the Presidential Chair of the Association. Then there was Mr. Masterton, who was noted for his hard work up to the very end. To-day Edinburgh was fortunate in having Mr. Gracie as its Gas Engineer and Manager. During the last few years the consumption of gas had increased enormously.

Mr. Fulton, in seconding the vote of thanks, congratulated the President on his splendid address.

Mr. Gracie said he hoped the address he had prepared for them would be of value and encouragement to the younger members of the Association. He hoped it would stimulate them to put forward their best efforts for the development of the industry. If the paper was looked upon as an incentive to the younger members of the profession, then he would be more than repaid for the trouble he had taken. He desired to acknowledge the help he had received from the members of his staff in the compilation of the address.

[The remainder of our report, including Mr. R. T. Simpson's paper on "Valuation and Taxation of Gas Undertakings" is unavoidably held over.]

# SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

The Annual General Meeting of the Scottish Western Juniors took place in the Grand Hotel, Charing Cross, Glasgow, on Saturday, March 31—Mr. R. Fife, of Kilmarnock, presiding.

The Hon. Secretary submitted the Council's annual report and financial statement, which were unanimously adopted. The report states that the total membership is now 310, and mentions that the Association have become affiliated to the Joint Council of the British Junior Gas Associations.

Mr. J. Murray, of Glasgow, automatically became President for next session. On the recommendation of the Council, Mr. R. Keillor, of Greenock, was unanimously elected Vice-President. Mr. T. F. Carswell, of Glasgow, was re-elected Hon. Secretary and Treasurer; and the following were elected to Council after a vote: For two years, Messrs. A. McDonald, B.Sc. (Motherwell), D. Melvin (Uddingston), A. Tran (Helensburgh), W. Currie (Glasgow), W. Scott (Glasgow); for one year, W. Kirk (Polmont).

Mr. C. Gill and Mr. M. E. Collier were re-elected Auditors.

The Chairman, in introducing Mr. W. M. Mason, Manager of the British Commercial Gas Association, expressed, on behalf of the Scottish Western Juniors, their great pleasure in having Mr. Mason, who was their first Secretary, to deliver the final address for the session. [Mr. Mason's address was published in the "Journal" for April 11, p. 124.]

### Discussion.

The Chairman said that the neglect from which the selling side of the industry suffered might be due to the facts that salesmanship was not an essential part of their general training, and that the industry had had no serious rivals for many years. When they gave careful study to their competitors' efforts, as indicated by Mr. Mason, they were bound to agree that they must adopt what means they could to keep the advantages of gas before the public. He had experience of the work of the electrical salesman, and of the progress which a capable man could make. The great organization of which Mr. Mason was Manager was doubtless a big factor in the gas industry's progress. It was, indeed, essential to future prosperity.

Mr. J. Murray (Glasgow) thanked the members for the honour they had conferred on him in electing him President. He assured them that he would do all in his power to further the interests of the Association. With regard to Mr. Mason's address, he was sure each member present felt refreshed and stimulated. On the question of the importance of propaganda, Mr. Murray instanced a case of a University Lecturer advising final-year medical students that gas for domestic use was obsolete. A copy of the "B.C.G.A." "A Thousand-and-One Uses for Gas" (showing the uses to which gas was put in the large hospitals in London) was sent the Lecturer, who at the next lecture completely reversed his previous talk, and pointed out the many uses to which gas could be applied.

Mr. R. Keillor (Greenock) expressed his thanks to the members for having appointed him Vice-President for next session.

Mr. J. W. McLusky (Glasgow) referred to an old-fashioned tradition in Britain that, if an article was satisfactory, it sold itself, and that satisfied customers were sufficient advertisement for the producers and salesmen. This theory belonged to the past; and progressive people who desired development of sales had no alternative but to join the ranks of the advertisers. He foreshadowed the coming of a scheme of publicity for the gas industry which would not only embrace advertising the advantages of the uses of gas, but would include the production and sale of all materials and appliances connected therewith. He congratulated Mr. Mason on the good publicity work done by the "B.C.G.A.," which had advanced the sales of gas enormously.

A cordial vote of thanks was then accorded Mr. Mason for his instructive address, after which members adjourned for tea, which was followed by whist and dancing.

During an interval, the prize given by Mr. McLusky was presented to Mr. R. Fife, of Kilmarnock, for his paper entitled "Metals Used in Gas-Works Practice."

Mr. J. Hall then presented the retiring President with his medal; and Mr. Fife, in replying, expressed his appreciation of the support given him by the members of Council and the office bearers.

# MR. H. H. GRACIE'S PRESIDENTIAL ADDRESS.

**North British Association of Gas Managers, April 13.**

Gentlemen,—The honour which you did me at your last general meeting in electing me to the dignified office of President of this old-established and progressive Association is deeply appreciated; and I wish sincerely to reiterate my thanks to you.

It is now over thirty years since I joined the Association, and during that time I have received many benefits and much kindness from both Presidents and members. I am therefore glad of the opportunity to add something, which I trust may prove a useful contribution, to the fund of information and knowledge to be found within its transactions. To bring before you something new and interesting has been the subject of long and serious reflection; and I have kept well in mind the many excellent and thoughtful Addresses your Presidents have delivered in the past, and the numerous subjects which have been discussed. These subjects have been so thoroughly explored by others that to add anything useful to present knowledge concerning them seemed almost beyond the realm of possibility. Therefore, after much cogitation, I decided to take what I felt at the present juncture might be a topic somewhat off the beaten track, and to give you in as full detail as is possible, within the limits of a Presidential Address, a résumé of:

(1) The history of the introduction of gas into Edinburgh.
(2) The development of the Edinburgh Undertaking under Municipal management during the last four decades.

As this current year completes forty years of local administration—it being now almost that time since the undertakings of the two Gas Companies operating in the area were acquired by the Edinburgh and Leith Corporations and the formation of a Gas Commission for the administration of the Undertaking—I hope that it will prove a fitting and interesting theme.

If we compare the Gas Industry of to-day with what it was some forty years ago, it must give us profound satisfaction to know that our industry, whose doom has often been foretold, is more thriving and virile than ever. It is steadily growing stronger, its products are more sought after, and fresh fields are opening up daily for its conquest. After such a review, we must all be optimists, and if we unite in the propagation of knowledge of its services, and its usefulness to mankind, there is no doubt that we shall continue, with good reason, on the road to becoming super-optimists.

## 1.—HISTORY OF INTRODUCTION OF GAS INTO EDINBURGH.

In the year 1817—over 110 years ago—gas from coal was first introduced into this city. The Edinburgh Gas Light Company having been established in 1816, application for an Act and Charter was made in 1817, the Town Council of that time having granted permission for the opening of the streets and the laying of pipes. The original works were located on the site of the old gas-works at New Street; and they continued to be used for gas-making until demolished in 1906. It is interesting to record that this area—with the exception of a portion retained for workshops connected with the distribution department—has lately been acquired by the Scottish Motor Traction Company, Ltd.

An extract from the "Edinburgh Evening Courant" of Saturday, March 4, 1820, dates the first lighting of the streets by gas. It says: "On Saturday night the public lamps in the High Street between the Bridges to the Parliament Square were lighted for the first time with gas. This has been done by the introduction of a single cockspur light into each of the old globes in which the oil lamps were formerly suspended."

The Edinburgh Gas Light Company was not long established before another Company—the Edinburgh and Leith Gas Light Company, with works at Baltic Street, Leith—started in opposition. This was in 1823. The intention of this Company was to supply oil gas; but the project proved unprofitable, and power to distribute coal gas was obtained.

A year later, in 1824, the Edinburgh Oil Gas Company, with Sir Walter Scott, Bart., as Chairman, was formed "for the purpose of augmenting the domestic comfort of the inhabitants by supplying the material of a light, equally pure, brilliant, and economical." The works of this Company were at Tanfield, near the site of our existing gasholders; but in 1829 it was absorbed by the original Company.

The copper plate recording the laying of the foundation stone of the Oil Gas Company's Works at Tanfield on May 24, 1824, along with the chair occupied by Sir Walter Scott at the Company's meetings, is now preserved in the City Museum.

A keen rivalry set in between the two remaining Companies; and duplicate mains and services were laid in all the principal thoroughfares. In 1866, however, a districting arrangement was effected whereby the area was divided between the two Companies. This appears to have worked satisfactorily, and the two Companies continued to thrive alongside each other. It is interesting to mention that about the year 1840 the price of gas was 8s. 6d. per 1000 c.ft.

## 2.—THE DEVELOPMENT OF THE EDINBURGH UNDERTAKING.

### The Gas Commission.

It was in 1888, after a long and protracted Parliamentary Investigation, that the Edinburgh and Leith Corporations' Gas Commissioners was formed to take over and administer the gas undertaking for the benefit of the citizens of Edinburgh and Leith. No one can doubt that this was a wise procedure. There may have been many who thought, and there may still be some who think, that too high a price was paid for the works, plant, and goodwill, seeing that, within about ten years, it became necessary to construct new and modern works at Granton, and to scrap those which had been purchased at such heavy cost. The sum paid to the Edinburgh Gas Company and the Edinburgh and Leith Gas Light Company—the two concerns that formerly carried on the business, which had proved highly remunerative to the shareholders—was in the form of Annuities, representing in round figures nearly £1,000,000.

There were at that time two works—one at Edinburgh, the other in Leith—with an Engineer and Manager in charge of each. These works made between them 1225 million c.ft. of gas per annum. The price was therefore equivalent to about £820 per million, or 16s. 5d. per 1000 c.ft. of gas made—a fairly heavy capital burden in those days, when it is remembered that there was little or no room on the existing sites for extensions, and that new works would require to be constructed at a comparatively early date. The congestion is forcibly emphasized by the evidence of the late Sir George Livesey, who stated that the New Street Works were so fully occupied that the only way to add to their manufacturing capacity would be to build another storey on them, similar to the tenement flats in the Canongate adjoining. It will readily be seen, therefore, that, comparatively soon after the transfer, the bulk of the original capital became a distinct incubus on the consumer, as it was unrepresented by any manufacturing assets; only a small portion of the old plant being suitable to transfer to the new site.

### Paying-off Capital Sunk in Old Works.

The result naturally eventuated that the original capital became a standing burden which, later on, the Board of Trade, when considering the granting of facilities for raising additional capital for new works, insisted should be liquidated as rapidly as possible. In order to secure this, they stipulated that a charge of 2d. per 1000 c.ft. of gas sold annually should be added to the price of gas. Fortunately this old capital has now all been repaid; this desirable consummation having been reached by the end of 1925. It was hastened by the surpluses resulting from the preceding years' trading, which were partly utilized to liquidate the old debt, and partly to bring down the price of gas, so that the consumers benefited in both ways.

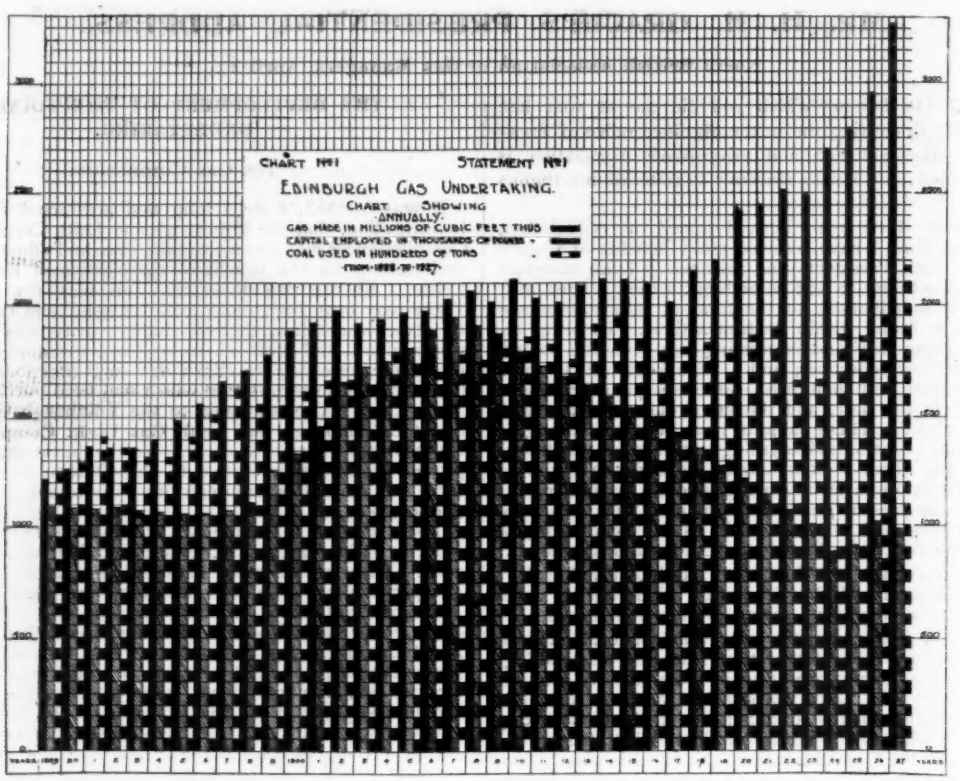
### New Works and Plant at Granton: Transfer to Edinburgh Corporation.

In the meantime, however, new works had been put up involving aditional heavy expenditure, which, in its turn, is being gradually paid off. At the same time special efforts have been made, consistent with safety and efficiency, to curtail to the minimum further outlay on new plant; and so successful has this policy proved that the latest expenditure on vertical retorts, exhausting, condensing, scrubbing, purifying, boosting, and sulphate of ammonia plant, has been incurred without increasing the outstanding capital debt beyond the figure at which it stood when the Edinburgh Corporation took over the Gas Commission under the Edinburgh Extension Act of 1920. Indeed, as will be seen from the Chart No. 1, this debt is now actually some £200,000 lower.

In the examination which follows, I have endeavoured to confine my attention to outstanding matters connected with the engineering and administrative sides of the undertaking, on the true interpretation of which, and the correct adjustment of policy, hang the continuation of successful working. In order to simplify matters, and to make them readily understood, I have had a large number of charts prepared, and the relative figures printed in tabular form. These will enable you to follow easily, step by step, the progress of the concern, and they show how the undertaking has reached the sound and efficient position in which it stands to-day. It is fully equipped in every direction, and ready for easy extension to meet the demands which may be made upon it, and any competition which it may be called upon to combat.

### Concentration on Distribution and Sales.

Having seriously tackled and solved, I think with marked success, the problem of producing gas economically at the works, our attention is now more concentrated on the distribution and




selling of the gas in up-to-date and highly efficient appliances for the joint benefit of the consumers and undertaking.

I shall have an opportunity later on of showing how this later development has affected the labour and financial sides of the business. But it may here be mentioned that there has been a great increase in the number of employees engaged in distribution, with a corresponding rise in the cost of conducting this side of the business, consequent upon its increasing relative importance.

### Old and New Conditions Compared: Sale of Gas.

When one compares, with the conditions existing to-day, the ease with which gas was sold in the old days, the small cost then involved in distribution and sales—labour and material being at a very low figure—and the comparative freedom from worry and anxiety entailed, due to the fact that the public were running after us to give them supplies, it will be readily understood how the selling side of the problem, neglected for so long, now absorbs so much expenditure, time, and attention. The results, however, are most encouraging; and the education of the community in the proper burning of gas and the utilization of the best appliances proceeds apace. At the same time, the enormous extension of the processes in which gas can be utilized, including as they do its adaptation to over 3000 trades, makes the prospect for the future exceedingly bright. When we remember that many of these uses are only in the early stages of development, and that much publicity, propaganda, and educative work lie to our hand ready to be tackled, we begin to realize what is in front of us, and what is necessary to ensure that the public may reap the blessings and comforts derivable from the utilization of gas to its fullest extent.

### Area of Works.

It may be useful here to contrast the areas occupied by the old and the new works. The Edinburgh Works covered 4½ acres; the maximum daily make reaching 4¼ million c.ft. This gave a little more than 1 acre per million per day. At the Leith Works, 1¾ acres were occupied; the make being barely 2 million c.ft. per day—a little less than an acre per million.

At the Parliamentary Inquiry, evidence was led to show that the recognized manufacturing area per million c.ft. per day was, for large works, about two acres. From these figures the congestion existing at the old works will be readily realized. The area purchased for the new works at Granton amounts to 106 acres, which shows wise and prudent foresight, and ample provision for the future. Up to the present, about 50 acres (equal to 3½ acres per million c.ft. per day) are utilized for gas manufacture, storage, and working-up of residual products. This last-named operation was not carried out at the old works—the tar and liquor being sold as produced—nor was there gasholder storage on either works. It may be added that the output can still be considerably increased on the presently occupied area. The provision of ample space for the carrying on of the various processes and for the storage of bye-products has led to economical working and simplicity of arrangement.

### Capital Charges.

Let us now examine the capital employed in the undertaking, and its effect on the price of gas; also how it has varied year by year, and how the interest and sinking funds have operated. The total capital expended on the undertaking to the present time is £2,544,527.

You will see (Statement No. 1) that in 1889 the debt was £1,081,303, and that this represented £882 14s. per million c.ft., or 17s. 8d. per 1000 c.ft. of gas made—a very heavy burden to carry in these days. Examining the figures year by year as they are given in Chart and Statement No. 1, we observe that by 1898 the outstanding debt had increased to £1,105,951; but the equivalents had been reduced to £647 per million c.ft. and 13s. per 1000 c.ft. respectively. After this,

## STATEMENT No. 1.—(Chart No. 1.)

*Capital Debt, Gas Made, Revenue, Expenditure, Interest and Sinking Fund Charges from 1888 89 to 1926 27 over Varying Representative Periods.*

| Year ended May 15. | Outstanding Capital Debt. | Outstanding Capital per Million C.Ft. Gas Made. | Outstanding Capital per 1000 C.Ft. Gas Made. | Total Gas Made Annually, C.Ft. | Gross Revenue. | Manufacture and Distribution Charges, including Rates and Taxes. | Interest and Sinking Fund Charges. | Interest and Sinking Fund per 1000 C.Ft. Gas Sold. |
|---|---|---|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | s. d. | | £ s. d. | £ s. d. | £ s. d | d. |
| 1889 . . | 1,081,303 12 3 | 882 14 0 | 17 8 | 1,225,194,000 | 195,324 2 6 | 124,887 0 2 | 31,370 19 6 | 7·61 |
| 1890 . . | 1,080,628 17 1 | 848 17 8 | 17 0 | 1,273,345,000 | 219,253 12 6 | 188,293 12 6 | 46,794 17 7 | 9·99 |
| 1893 . . | 1,070,420 5 2 | 787 1 5 | 15 9 | 1,360,049,000 | 260,310 9 5 | 217,676 0 2 | 54,356 5 7 | 10·59 |
| 1898 . . | 1,105,950 19 0 | 647 2 8 | 13 0 | 1,708,551,200 | 247,047 2 10 | 192,052 5 8 | 51,897 10 3 | 7·99 |
| 1903 . . | 1,722,159 17 4 | 899 15 4 | 18 0 | 1,913,649,000 | 329,052 8 9 | 246,565 17 3 | 79,184 5 4 | 10·54 |
| 1908 . . | 1,907,101 9 3 | 918 12 10 | 18 4 | 2,075,828,000 | 351,063 1 8 | 248,055 16 1 | 101,572 9 4 | 12·57 |
| 1913 . . | 1,642,743 18 7 | 783 5 6 | 15 8 | 2,096,346,000 | 364,877 5 11 | 246,883 8 10 | 109,864 11 9 | 13·43 |
| 1918 . . | 1,356,018 16 8 | 626 0 7 | 12 6 | 2,165,890,000 | 464,845 11 0 | 366,939 12 8 | 117,690 8 6 | 14·27 |
| 1920 . . | 1,207,574 15 11 | 491 4 5 | 9 10 | 2,438,260,000 | 716,085 5 5 | 552,148 11 11 | 122,143 13 4 | 13·35 |
| 1923 . . | 1,019,483 12 2 | 407 19 1 | 8 2 | 2,499,218,000 | 653,329 8 5 | 481,990 1 1 | 107,866 4 8 | 10·96 |
| 1927 . . | 999,731 11 10 | 363 17 6 | 6 1 | 3,289,543,000 | 792,080 6 7 | 632,450 5 10 | 99,147 17 9 | 7·72 |

owing to the construction of the new works at Granton, the capital began to ascend again, reaching £1,907,101 in 1908, or £918 per million, and 18s. 4d. per 1000 c.ft. made. Following this, and owing to the cessation of capital expenditure, the operation of the Sinking Fund, and the regulations of the Board of Trade for wiping-out the capital debt on the old works, it fell rapidly year by year. In 1920, when the Gas Commission was taken over by the Edinburgh Corporation, the outstanding debt was £1,207,574, equal to £491 per million, and 9s. 10d. per 1000 c.ft.; and at the close of 1927, it had been still further reduced to £999,731, equivalent to £303 per million and 6s. 1d. per 1000 c.ft. of gas made. This was largely contributed to by increasing business, economical working, and the accumulation of large surpluses—mainly used for the wiping-out of debt. It should be noted that the cost of new vertical retorts, exhausters, purifiers, and other ancillary plant, inaugurated in 1926 by T.R.H. the Duke and Duchess of York, is included in the above figures. If we can continue to progress at anything like the present rate, the whole debt may be wiped out in twenty to twenty-five years. As it still requires some £99,000 per annum to meet the interest and sinking fund charges, and these represent nearly 8d. per 1000 c.ft. of gas sold, the truth of the saying "Happy is the undertaking that has little capital debt" will be appreciated.

### Revenue and Expenditure.

The gross annual revenue has grown rapidly with the expansion of business (see Statement No. 1). In 1890, the first full year of working, it amounted to a total of £219,253, and in 1927 it was £792,080. The manufacturing and distribution costs, including maintenance, administration, and rates and taxes, have advanced correspondingly from £188,293 in 1890 to £692,450 in 1927—the differences representing gross profit. The sums appropriated for payment of annuities, sinking fund, interest, &c., for these years were £46,795 and £99,148 respectively; and it will be observed from the statement that they represented in 1890 9·99d. and in 1927 7·72d. per 1000 c.ft. of gas sold, having reached as high a figure as 14·92d. in 1917, during the Great War.

### Coal Carbonized.

As coal is the material from which gas is produced, it may be well to start by comparing the classes of coal purchased, and the choice of the various grades, the valuation of the coals, the quantities required, the cost, and the results obtained forty years ago and now.

### Experimental Plant and Valuation of Coals.

I may mention here that there was an experimental plant at both works, in which a close investigation of the value of the coals was made; the results being tabulated and compared. It is interesting to note that even in those days the necessity for "trying out" the various seams was fully recognized, and given effect to on a practical scale. Owing to the congestion within the New Street Works, there was not sufficient space for a full-sized meter to register the gas made in the test plant, so the difficulty was got over by introducing a differential or proportional meter which measured exactly one-fifth of the total gas produced.

The coke was also examined, but was judged largely by its appearance and from its results in the furnaces. Indeed, I do not remember, at that time, any tests—such as we carry out now, and which include moisture, volatile, carbon, ash, &c.—being made, except for ash content.

At that time the gas was tested on the illuminating power standard—the sperm candle. The coals, consequently, were valued on the basis of pounds of sperm per ton. This was arrived at by taking the quantity of gas made in cubic feet with the illuminating power, reducing these to pounds of sperm, and dividing the result into cost per ton, after deducting the value of coke. This will be better understood from an example, thus:

| — | C.Ft. per Ton of Coal. | Illuminating Power, Candles. | Equivalent Lbs. of Sperm. | Cost per Ton of Coal. | Deduct Value of Coke per Ton of Coal. | Net Cost of Coal per Ton. | Cost per 100 Lbs. of Sperm. |
|---|---|---|---|---|---|---|---|
| | | | | s. d. | s. d. | s. d. | d. |
| First-class cannel . | 10,578 | 25·95 | 941 | 27 9 | 5 4 | 22 5 | 28·58 |
| Third-class coal . | 9,736 | 20·89 | 697 | 13 6 | 4 0 | 9 6 | 16·35 |

It will be noticed that, though the cost per 100 lbs. of sperm from the first-class cannel is much more than from the third-class coal, the former was essential to maintain the illuminating power standard.

### Use of Shale.

There were several shaley cannels used in carbonizing which gave no useful coke, the resultant product—after the gas was driven off—having to be removed with the ashes. It was, indeed, a part of the bargain in purchasing these shales that the seller undertook the disposal of the residue. This accounts to some extent for the small return from coke per ton of coal which will be referred to later. The quantity of these shales carbonized represented from 25 to 45 p.ct. of the total coal used. About this time considerable controversy arose as to whether it was or was not profitable to carbonize shales, which, as you can guess, gave a very good yield of rich gas and tar.

### Illuminating Power Standard Reduction.

Managers were also at loggerheads on the question of raising or lowering the standard of illuminating power. It was then, in Scotland, from 26 to 28 candles. Opinion was fairly evenly divided, but eventually those favouring reduction gained the day; and the general trend for a lower standard set in. This was probably hastened by some of the English companies—London and others—obtaining powers to reduce their quality; one reason being that they had not ready access to the high-quality coals—shales and cannels—with which Scotland was well provided. The movement soon became general, and the standard was stabilized first at 16, then 15, and later 14 candles. But those figures reigned for a long time—indeed, up to the period when it began to be generally recognized that the heating power of gas was the fairest and truest measure of its quality and value.

### Classification of Coals.

I have digressed from what I had in mind—namely, an examination of the classes of coals used. I find on going over the records that the coals were classified according to the results obtained. Among the first class were the highest quality of cannels, chiefly from the Lothians and Fifeshire; in the second class, numerous other cannels and high-grade coals, several of which also came from the Fifeshire area; among the third and fourth classes were good splints and smaller varieties of coals. Even at that time the necessity was fully recognized of obtaining supplies from a large number of collieries, in order to ensure constant and regular deliveries, and to guard against accidents, breakdowns, disputes, and stoppages. Of course, the outputs of the collieries were not what they are to-day. Indeed, many of the coals then in use have been worked out or merged into other seams.

### Coals Bought for Edinburgh Works with Prices, 1892.

A typical example of the coals bought may be obtained from a statement of coals purchased in 1892, for the Edinburgh Works, amounting to 86,000 tons, to cover the portion of the year from September to May (the total quantity carbonized in twelve months at that time being about 135,000 tons). This order was spread over 28 collieries. There were seven second-class coals purchased, among which may be mentioned Haywood, Lanemark, Denbog, and Edmondston; twelve third-class, such as Elphinstone, Stairhead, Cowdenbeath, and Arniston; and nineteen fourth-class, including Newbattle Bottoms, Loganlea, Rawyards, and Riddochhill—the quantity from each colliery varying from 10,000 to 1000 tons, and the prices from 25s. down to 8s. 3d. per ton delivered. The average price of these worked out at 14s. 1d. per ton, which was taken as equal to about 17d. per 1000 c.ft. of 26 candle-power gas.

In the past few years we have had many coals through our hands, and have been systematically examining, analyzing, and comparing them, with a view to ascertaining their qualities and values for every purpose—such as their gas-making and bye-product producing properties; their ability to withstand handling; and suitability for storing in the open, exposed to wind and weather. We have at length arrived at a stage where, with the vast amount of accumulated data and experience, we are able to calculate, within a few pence, the value per ton to us of practically all the good gas-making coals within our economic reach.

In regard to weathering properties, these are determined by laying out in the yard small heaps of different coals, where they are thoroughly exposed to atmospheric conditions; at the outset taking samples and analyzing them in the laboratory as well as testing them in the experimental plant, and keeping full records. Samples are also taken from these heaps from time to time, and subjected to tests similar to those in the first instance in order to ascertain the depreciation. The results are enlightening, and show that depreciation is rapid at first, and can reach a very high figure in certain coals. This was our unfortunate experience during the recent coal dispute, when it was found that, after five years' exposure, many of the coals had lost their coking qualities (not very strong at any time) and that in most cases the coke was so friable and of such poor quality that it was with great difficulty the required temperatures were maintained in the settings.

For purposes of valuation, we now make a proximate analysis in the laboratory, followed until recently by an exhaustive test on a working scale in the experimental horizontal plant, which is, to all intents and purposes, a miniature gas-works. Two charges of 84 lbs. each are employed. The details have been carefully tabulated, and a value has been put on each of the resulting products. Having fixed a certain coal as standard, to which the figure of 100 is given, all others are compared with it, and their value is apportioned. Numerous tests are also made throughout the year of the coals coming into the works, to ascertain if they are being maintained at standard;

and it is remarkable how little variation under normal conditions is found among different samples of the same coal. In addition a wagon of each coal is hand-picked monthly; and the foreign matter and rubbish are weighed and put aside, for the Colliery Proprietors to examine and make adjustments. It is sometimes necessary to stop the supply for a period until matters are rectified. All this investigation work has resulted in many coals, which were considered good enough for gas-making a few years ago, being eliminated and others substituted.

I might here recall a series of complaints received some time ago regarding the "sparking" of our coke when burned in the open grate, and the consequent falling-off in sales. To arrive at the cause, it became necessary to carbonize separately a portion of each coal, and test the coke by itself. In this way we discovered the offending coals and stopped their supply. Since then we have had no trouble from that cause.

### Vertical Retort Test Plant.

The introduction of vertical retorts at Granton has rendered the foregoing statistics of less value than when the gas was made in inclined retorts. We have therefore isolated, on the new vertical bench, one of the ovens consisting of four full-sized retorts, carbonizing about 36 tons of coal, and producing some 500,000 c.ft. of gas per day, in order to utilize them as test or experimental retorts. We have also fitted up complete condensing, washing, scrubbing, tar extracting, and purifying plant, with a station meter, so that the value and suitability of the various coals for gas-making on the new principle may be fully adjudged on a working scale. At the same time, the conditions best suited to secure the maximum returns from these coals will be ascertained. These will show the progress which has been made in this particular line.

### Comparative Results from Horizontal and Vertical Test Plants.

As an indication of contrasts between the horizontal and inclined methods on the one hand, and the new verticals on the other, I give here particulars of tests of three high-class coals used on the works, and distinguished as A, B, and C.

(1) The results on the horizontal test plant, which figures were closely adhered to under working conditions on the inclines.

(2) The results as recently ascertained on the new vertical retort test plant, but with only one retort in action.

The differences and improvements are most marked, and show the advantage to be gained from a selection of coals best adapted for the type of retorts in use, and worked under the most suitable and efficient conditions.

*Comparative Results on Horizontal and Vertical Test Plant.*

| Coal. | Type or Test Plant. | Gas Made per Ton. | Calorific Value of Gas. | Therms per Ton. | Coke per Ton. | Ash in Coke. |
|---|---|---|---|---|---|---|
| | | C.Ft. | B.Th.U. | | C. Q. L. | P.Ct. |
| A. | Horizontal | 11,500 | 591 | 68·0 | 11 3 4 | 7·5 |
| | Vertical . | 15,434 | 501 | 77·32 | 14 0 0 | 7·27 |
| B. | Horizontal | 12,500 | 600 | 75·0 | 12 2 0 | 7 to 20 |
| | Vertical . | 16,042 | 515 | 82·62 | .. | |
| C. | Horizontal | 12,700 | 638 | 81·00 | 11 3 0 | 7 to 13 |
| | Vertical . | 17,660 | 515 | 91·00 | .. | |

### Coals Carbonized and Make per Ton.

We can now consider the quantities of coal carbonized, and the results obtained; and, in doing this, we must keep in view the quality of the coals purchased. You will have gathered

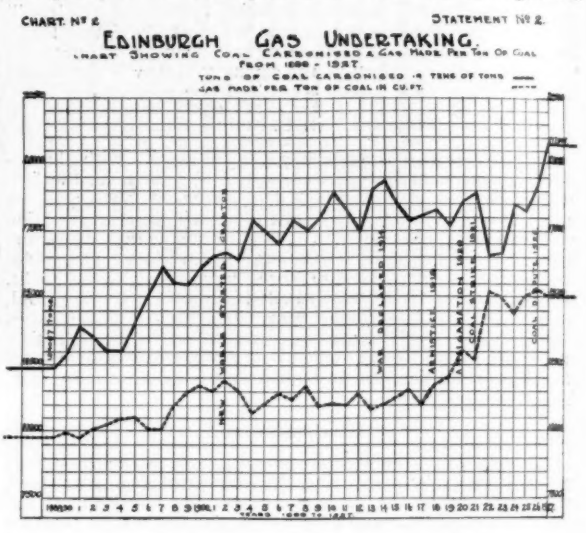


CHART Nº 2.
STATEMENT Nº 2.
EDINBURGH GAS UNDERTAKING.
CHART SHOWING COAL CARBONISED & GAS MADE PER TON OF COAL FROM 1888 - 1927.
TONS OF COAL CARBONISED IN TENS OF TONS
GAS MADE PER TON OF COAL IN CU.FT.

from my earlier remarks that much richer varieties of coal were made use of in the past; but, as the figures show, the results were not commensurate either with the quality or the price, according to present-day standards. Chart and Statement No. 2 show the quantities of coal carbonized year by year, and

### STATEMENT No. 2.—(Charts Nos. 2, 3, and 14.)

*Gas Made and Coal Carbonized Annually, Make, and Cost per Ton of Coal and Price of Gas*—1888 *to* 1927.

| Year. | Gas Made in C.Ft. Annually. | Percentage. Increase. P.Ct. | Percentage. Decrease. P.Ct. | Coal Carbonized Annually. Tons. | Gas Made per Ton of Coal. C Ft. | Average Price of Coal per Ton. | Net Cost of Coal per Ton. | Average Price of Gas per 1000 C.Ft. | Average Cost of Coal per 1000 C.Ft. of Gas Sold. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | s. d. | s. d. | s. d. | s. d. |
| 1889 . . | 1,225,194,000 | .. | .. | 124,057 | 9,876 | 11 9·83 | 8 6·87 | 3 5·22 | 1 4·17 |
| 1890 . . | 1,273,345,000 | 3·9 | .. | 128,221 | 9,931 | 11 7·80 | 8 4·45 | 3 5·22 | 1 3·58 |
| 1891 . . | 1,373,757,000 | 7·8 | .. | 140,515 | 9,776 | 16 9·86 | 11 10·35 | 3 8·17 | 1 9·72 |
| 1892 . . | 1,364,940,000 | .. | 0·6 | 135,219 | 10,094 | 18 6 34 | 15 4·01 | 4 5·22 | 2 0·61 |
| 1893 . . | 1,360,049,000 | .. | 0 3 | 132,038 | 10,300 | 17 1·C5 | 14 9·95 | 3 11·72 | 1 9·97 |
| 1894 . . | 1,394,287,000 | 2·5 | .. | 131,980 | 10,564 | 13 3·54 | 9 10·08 | 3 6·47 | 1 4·56 |
| 1895 . . | 1,489,309,000 | 6·9 | .. | 141,531 | 10,522 | 12 10·14 | 9 1·40 | 3 2·21 | 1 3·87 |
| 1896 . . | 1,554,437,000 | 4·4 | .. | 151,117 | 10,286 | 11 7·83 | 8 11·21 | 2 11·62 | 1 2·83 |
| 1897 . . | 1,664,147,500 | 7·5 | .. | 162,745 | 10,225 | 11 2·54 | 8 7·91 | 2 11·13 | 1 2·44 |
| 1898 . . | 1,708,551,200 | 2·6 | .. | 155,240 | 11,006 | 10 9·08 | 8 5·71 | 2 11·14 | 1 0·87 |
| 1899 . . | 1,784,699,000 | 4·4 | .. | 154,011 | 11,523 | 10 11·62 | 8 2·49 | 2 11·39 | 1 0·32 |
| 1900 . . | 1,882,685,000 | 5·5 | .. | 161,383 | 11,603 | 12 9·52 | 8 4·85 | 2 11·45 | 1 2·27 |
| 1901 . . | 1,917,548,000 | 1·3 | .. | 166,289 | 11,531 | 16 11 56 | 12 5·38 | 3 2·20 | 1 7·18 |
| 1902 . . | 1,971,591,000 | 2·8 | .. | 166,013 | 11,876 | 14 2·27 | 10 4·70 | 3 3·41 | 1 3 94 |
| 1903 . . | 1,913,649,000 | .. | 2·9 | 164,975 | 11,600 | 13 1·96 | 7 9 | 3 0·90 | 1 2·45 |
| 1904 . . | 1,943,365,000 | 1·5 | .. | 179,275 | 10,840 | 13 0·92 | 7 1·31 | 2 9·91 | 1 3·32 |
| 1905 . . | 1,969,647,000 | 1·3 | .. | 174,688 | 11,275 | 12 4·59 | 6 5·40 | 2 9·01 | 1 2·00 |
| 1906 . . | 1,977,847,000 | 0·4 | .. | 171,298 | 11,540 | 12 1·47 | 6 2·31 | 2 8·96 | 1 1·50 |
| 1907 . . | 2,046,973,000 | 3·5 | .. | 178,524 | 11,466 | 11 7·81 | 5 3·81 | 2 8·95 | 1 0·92 |
| 1908 . . | 2,075,828,000 | 1·4 | .. | 175,620 | 11,820 | 14 0 11 | 6 8·12 | 2 10·83 | 1 3·22 |
| 1909 . . | 2,016,742,000 | .. | 2·8 | 180,619 | 11,162 | 12 6·2 | 5 11·02 | 3 0·24 | 1 2·42 |
| 1910 . . | 2,102,425,000 | 4·2 | .. | 187,153 | 11,234 | 10 0·1 | 3 5·29 | 2 10·40 | 0 11·44 |
| 1911 . . | 2,044,182,000 | .. | 2·7 | 183,945 | 11,109 | 10 4 | 3 0½ | 2 7 99 | 1 0·04 |
| 1912 . . | 2,004,683,000 | .. | 1·9 | 175,354 | 11,429 | 10 4· | 2 1 | 2 7·28 | 0 11·55 |
| 1913 . . | 2,096,346,000 | 4·6 | .. | 191,874 | 10,925 | 11 0·4 | 1 1·9 | 2 7·30 | 1 1·01 |
| 1914 . . | 2,159,514,000 | 3 0 | .. | 194,599 | 11,097 | 13 6 | 5 0½ | 2 7·18 | 1 3·62 |
| 1915 . . | 2,115,981 000 | .. | 2·0 | 184,918 | 11,443 | 12 9·6 | 5 4·6 | 2 7·28 | 1 2·28 |
| 1916 . . | 2,092,171,000 | .. | 1·1 | 179,852 | 11,632 | 15 3·5 | 4 11 | 3 0·05 | 1 4·94 |
| 1917 . . | 2,019,101,000 | .. | 3·5 | 181,881 | 11,101 | 18 2 | 5 6½ | 3 2·99 | 1 9·21 |
| 1918 . . | 2,165,890,000 | 7·2 | .. | 183,502 | 11,803 | 19 6 | 7 9 | 3 5·32 | 1 9·70 |
| 1919 . . | 2,191,327,000 | 1·2 | .. | 177,910 | 12,317 | 22 4 | 7 8 | 3 11·60 | 1 11 89 |
| 1920 . . | 2,438,260,000 | 11·2 | .. | 186,507 | 13,073 | 26 4 | 9 1 | 4 10 84 | 2 2·89 |
| 1921 . . | 2,440,827,000 | 0·1 | .. | 188,541 | 12,945 | 34 9 | 12 11 | 5 0·69 | 2 10·95 |
| 1922 . . | 2,524,513,000 | 3·4 | .. | 165,368 | 15,266 | 35 2 | 20 0 | 5 4·28 | 2 5·16 |
| 1923 . . | 2,499,218,000 | .. | 1·0 | 166,065 | 15,049 | 22 1 | 5 8 | 4 1·87 | 1 6 71 |
| 1924 . . | 2,691,147,000 | 7·6 | .. | 186,614 | 14,420 | 24 7 | 6 0½ | 3 6·79 | 1 9·79 |
| 1925 . . | 2,794,501,000 | 2·2 | .. | 185,942 | 15,029 | 23 8 | 8 6½ | 3 4·78 | 1 8·31 |
| 1926 . . | 2,947,598,000 | 7·2 | .. | 193,385 | 15,242 | 20 9 | 9 4½ | 3 4·72 | 1 5·64 |
| 1927 . . | 3,289,543,000 | 11·6 | .. | 217,945 | 15,093 | 36 10 | 18 10 | 3 9·48 | 2 7·47 |

the gas produced per ton of coal. It will be observed that in 1888-89 124,057 tons of coal were used, and yielded 9876 c.ft. per ton of 27·78 C.P. gas. The amount of coal required annually gradually increased year by year, as the output advanced, and the yield per ton also improved, until in 1902 the tonnage had reached 166,013 and the yield had advanced to 11,876 c.ft. per ton—the quality of the gas having been reduced during the period to about 24 candles. The increased yield followed on the introduction of Siemens regenerative settings and carburetted water gas plant at the New Street Works, in 1896-97, and the appointment of a new Chief Engineer, who took over the duties and charge of both the Edinburgh and Leith Works.

Curiously enough, with the starting-up of the new works at Granton the make per ton fell again, reaching 10,840 c.ft. in 1904. This was without the addition of water gas. But it rose to 11,820 c.ft. in 1908—the quality being further reduced to a little over 20 candles. This figure included water gas; the plant having been transferred from New Street to the Granton Works. The make per ton hovered round this figure—being, if anything, slightly lower—up to 1919, when, with water gas, it reached 12,317 c.ft. per ton of raw coal. From 1920 onwards the make rose rapidly, attaining a maximum of 15,266 c.ft. per ton in 1922; this improvement being helped by a large percentage of water gas, owing to a change in policy—viz., the utilization of this plant daily, instead of keeping it as a stand-by. In this year, the total coal carbonized had fallen to 165,368 tons—a rather less quantity than was required in 1902 (20 years before), although the total production of gas had risen during that period by 553 million c.ft., equivalent to over 28 p.ct. The quantity of coal carbonized had previously reached a maximum of 194,599 tons in 1914. The average make per ton exceeded 15,000 c.ft. for the next few years—from 1922—until it became evident that, in view of the rapidly advancing demand and the gradual depreciation of the gas producing plant, which had been in use for over 20 years, it was necessary to examine the whole problem of the manufacturing arrangements.

During 1926-27 the tonnage of coal carbonized had advanced still further—up to 217,945 tons—the yield and total output being correspondingly high. Comparing these figures with those of 1888-89, we find that, while the quantity of coal carbonized was enlarged by only 75½ p.ct., the total make of gas increased by 168½ p.ct. The make of gas per ton of coal during the same period improved by over 54 p.ct., all this notwithstanding the lower quality of coals now carbonized, compared with those in use some 40 years ago.

The quantity of coal now required in the course of a year having reached over 220,000 tons, the orders are distributed over twelve to eighteen collieries, in quantities varying from 40,000 tons to 5000 tons. The coal carbonized is at present chiefly drawn from the Lothian Pits—indeed, the purchases from these fields represent about 75 p.ct. of the total requirements, and include Arniston, Newbattle, and others. There is also a percentage of coals from the Lanarkshire area—such as Climpy, Kingshill, and Wilsontown. The average delivered price for the current year, for coal to produce a gas of 500 B.Th.U., works out at 17s. 10d. per ton in railway companies' wagons, but was actually 36s. 10d. in 1926-27.

### Increased Cost of Railway Transport.

While on the subject of coal, may I say that I have examined the relative cost of transport, and ascertained how this has risen over the last forty years. I find that, whereas in 1890 the railway rates for coal to our works averaged 1s. 9¾d. per ton delivered, they have now increased to 3s. 2¼d.—an extra 1s. 4½d. per ton, or nearly 76 p.ct. Thus, of the additional cost which we now have to pay for coal (without making adjustments for quality)—viz., 6s. per ton (from 11s. 10d. to 17s. 10d.), which equals an advance of more than 50 p.ct. above the 1888 figures—23 p.ct. is represented by railway rates, though the average distance from which the coal is brought is now much shorter.

These figures would, without further examination or explanation, give the impression that coal had not advanced in price so much, relatively, as other materials and items of expenditure; but, from my previous remarks, it will be evident that, in order to maintain the high quality of gas formerly produced on the illuminating power basis, a large quantity of very rich and relatively expensive coals was purchased in 1888, and for some years thereafter. I have, therefore, gone carefully over the list of coals bought at that time, with their corresponding costs, and have come to the conclusion that an average price of 8s. 10d. per ton then would represent the same quality of coal as now purchased. We can therefore safely say that coals are now costing us double what they cost some forty years ago. In this price is included the railway transport charges, which may also be taken at approximately the same percentage advance, keeping in mind the shorter haulage now required.

There are a few other matters bearing on the subject of coal which may be usefully commented on here, such as use of private wagons, storage, &c.

### Private Railway Wagons.

We own a number of railway wagons in which about 86,000 tons of coal, equal to (say) 43 p.ct. of the total, are carried annually, effecting a saving of from 5d. to 9d. per ton. In regard to these wagons, the first batch of which was purchased in 1910, let me say that I consider them an indispensable adjunct, especially to a large works. In addition to coal traffic the wagons are used for the transport of coke to Leith and Granton harbours for shipment, and for other purposes on the works, such as removing ashes, refuse, &c., to the tip. They were also of incalculable value during the coal dispute for taking delivery of foreign coal at the docks and transporting it to the gas-works, thereby avoiding delays, demurrage, cost of emptying and refilling, and other charges.

From last year's return, which, however, includes the long drawn-out coal dispute, it is seen that 47,486 tons of coal, 5007 tons of coke, and 700 tons of bog ore—a total of 53,193 tons—were carried in the wagons, at a saving of £1128 in railway charges, not to mention demurrage. Taking into account the many other uses to which the wagons are put, we reckon that, after deducting interest, depreciation, and repairs, there was a profit of about £1000 in that year. The wagons cost in pre-war days from £65 to £75 each; but to-day it may be taken to be more than double those figures. We have 212 trucks, representing about 30 p.ct. of the total wagons normally employed throughout the year, and the individual capacities vary from 10 to 12 tons of coal. I have ascertained that the average number of journeys made by the wagons between the collieries and the gas-works is four per month, and the average distance between the collieries and the gas-works is 17 miles. Nothwithstanding the adverse circumstances last year, we reckon that the wagons employed on coal traffic alone showed a credit balance of £20 each per annum.

### Storing Coal: Dangers and Precautions.

During the recent coal dispute we, along with many other undertakings, gained painful, though practical, experience of working with coals which had been stored for several years. It will be of interest to record that portions of the American coal which had been lying in stock since the previous mining disturbance in 1921 were found to have weathered better than many of the Scotch coals. Indeed, the coking properties of the former were only slightly reduced, and the gas-making results were not much below the original figure. We are therefore retaining a quantity in stock, against eventualities. A good deal of trouble was experienced with this coal through spontaneous ignition; and it was not until we had turned over the bing, and reduced the height to not more than 12 ft., that we overcame this propensity.

While on the subject of spontaneous ignition, let me tell you an unfortunate experience of this phenomenon, at the end of 1926, and on this occasion with Silesian coal which had only been in the yard for a few weeks. Fire broke out without any previous warning throughout a large bing containing some 6000 tons, and before it could be extinguished, which was only accomplished after 3 or 4 weeks by digging out the heated portions, over 2000 tons had been destroyed. It will give you an idea of the hold which the fire got when I tell you that at night the glare from the heated mass could be seen some miles away. In regard to these fires, our experience is that water is useless. If anything, it is an added danger, as the volume of steam produced in the heated mass appears to be converted into a form of water gas, and, if not consumed on the spot, may be blown into other parts of the works, with considerable danger and inconvenience to the workers. In the procedure we now follow in laying down coal, special precautions are taken to guard against fire, by storing it in separate bings from 40 to 45 ft. wide at the base and not more than 15 ft. in height, each containing about 5000 tons. Tubes are inserted in the bings, from 15 to 20 ft. apart. Three temperature readings are taken daily in the tubes—one at the bottom, one in the middle, and one near the top—and are carefully recorded. If the bings have to be raised to a greater height than 15 ft., the tubes are placed at 15 ft. apart. When the temperature exceeds 75° Fahr., a close watch is kept; and if it rises over 80°, and continues to rise, immediate action is taken, because, once it gets up to about 150° it is only a matter of hours before ignition takes place.

### Gas and Coal Statistics.

In considering the statistics of development over the past 40 years, the charts and statements which have been prepared will show clearly and quickly the many changes that have taken place and the increases or decreases arising. Taking Chart No. 3 and Statement No. 2, which gives the gas made year by year, we find that in 1888-89 this amounted to 1,225,194,000 c.ft., while in the year 1926-27 it reached the record total of 3,289,543,000 c.ft., which is more than 2⅝ times the quantity required in 1888 (to be accurate, an increase of 168½ p.ct.). The increase in 1926-27 is 11·6 p.ct. over the preceding one, which had shown an advance of 7·2 p.ct. If this rate of progress could be maintained over the next 40 years, it will be abundantly evident that very great and important

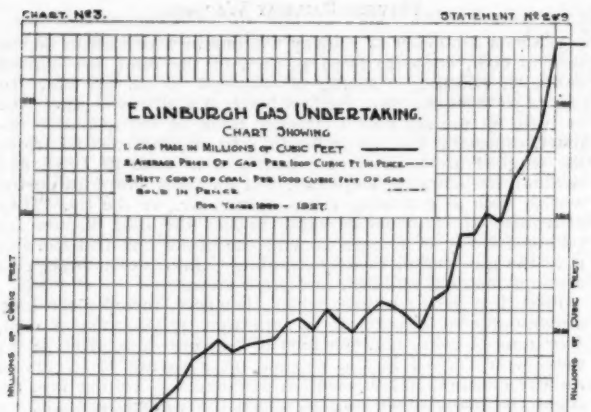


CHART. No 3.
STATEMENT No 2 of 9
EDINBURGH GAS UNDERTAKING.
CHART SHOWING
1. GAS MADE IN MILLIONS OF CUBIC FEET
2. AVERAGE PRICE OF GAS PER 1000 CUBIC FT IN PENCE.
3. NETT COST OF COAL PER 1000 CUBIC FEET OF GAS SOLD IN PENCE.
FOR YEARS 1889 - 1927.
MILLIONS OF CUBIC FEET
MILLIONS OF CUBIC FEET

additions would be called for both to the manufacturing plant at Granton and to the distributory system.

In order to obtain a full understanding of the forces operating, I have introduced on Chart No. 3 and Statement No. 2 the net cost of coal per 1000 c.ft., and the rates charged for gas year by year to ordinary consumers. It will be at once apparent how these figures react on each other; and their application will, I think, be readily understood.

### Cost of Coal per Ton and per 1000 C.Ft. of Gas Sold.

I have also worked out in Statement No. 2 and Charts Nos. 11 and 12 the gross cost of coal and cost per 1000 c.ft. of gas sold, and the small variation in the latter year by year and over a period is somewhat singular. The lowest figure touched was in 1910—viz., 11·44d. per 1000 c.ft.—when coal was at its lowest (10s. per ton). The relative costs of 1s. 4·17d. for 1889 and 1s. 5·64d. for 1926 are remarkably close; the corresponding prices of coal per ton being 11s. 9·8d. and 20s. 9d. respectively. The Chart and Statement No. 2 indicate the increased yield obtained per ton of coal—viz., from 9876 c.ft. in 1889 to 15,242 c.ft. in 1926—which helps to compensate for the higher price of coal in 1926.

### Gas Made Year by Year and Price of Gas.

In Chart No. 3 and Statement No. 2 will be found the quantity of gas made year by year and the percentage variation. These figures are very enlightening. From a close study of the chart, it will be observed that there was a steadily increased make for the first two years; and for the next three it was almost stationary—that is, up to 1894. On examining the price of gas in Chart No. 3, we see that the rate in 1889 was 3s. 6d. per 1000 c.ft.; and this was advanced to 4s. 6d. in 1892-93, the gross cost of coal having risen in that period from 11s. 9d. to 18s. 6d., and the net cost from 1s. 4·17d. to 2s. 0·61d. per 1000 c.ft. From 1893 to 1902 the output steadily increased; the price dropping to 3s. per 1000 c.ft. in 1898. Coal also fell in price to as low as 10s. 9d.; but thereafter it had a rising tendency, and reached 16s. 11d. in 1901.

*(To be continued.)*

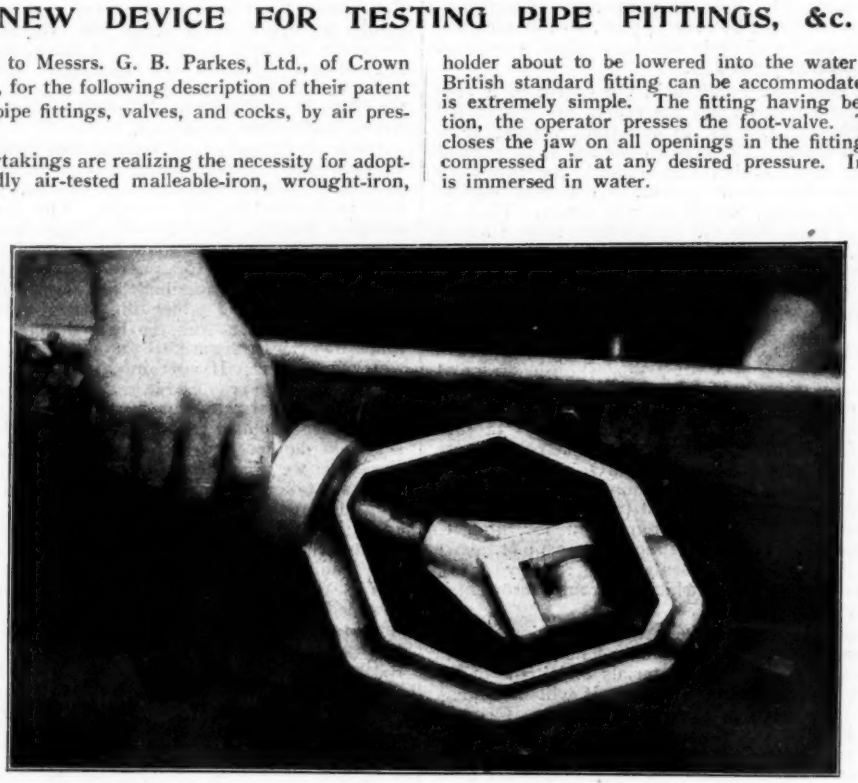
## NEW DEVICE FOR TESTING PIPE FITTINGS, &c.

We are indebted to Messrs. G. B. Parkes, Ltd., of Crown Works, Halesowen, for the following description of their patent device for testing pipe fittings, valves, and cocks, by air pressure under water.

To-day, gas undertakings are realizing the necessity for adopting only individually air-tested malleable-iron, wrought-iron, and brass fittings. The old-fashioned hydraulic test is being gradually replaced by the air-under-water test, wherever gas, petrol, or high-pressure is being dealt with. Messrs. G. B. Parkes, Ltd., state that for the purpose of detecting leaks the air-under-water method is eight times as effective as the old hydraulic test.

This apparatus, which was exhibited at the British Industries Fair for the first time, deals with the matter of testing on mass production lines in a comparatively simple and inexpensive way, from the point of view of installation.

In the accompanying illustration, a ½ in. elbow is seen in the holder about to be lowered into the water; but any type of British standard fitting can be accommodated. The operation is extremely simple. The fitting having been placed in position, the operator presses the foot-valve. This automatically closes the jaw on all openings in the fitting, and fills it with compressed air at any desired pressure. In this condition it is immersed in water.



Messrs. G. B. Parkes, Ltd., are one of the oldest and largest British manufacturers of malleable iron pipe fittings, being the makers of the well-known "P" brand fitting.

**Illuminating Engineering Society.**—A Meeting of the Illuminating Engineering Society will be held on Tuesday, April 24, at 6 o'clock, at the Home Office Industrial Museum (Horseferry Road, Westminster, S.W.), when a discussion on "Daylight, Artificial Light, Artificial Daylight: Their Merits and Drawbacks," will be opened by Mr. J. S. Dow.

# FIFTH ANNUAL REPORT OF THE JOINT BENZOLE RESEARCH COMMITTEE, 1928.

Reviewed by Dr W. B DAVIDSON.

The Fifth Annual Report of the Joint Research Committee of the National Benzole Association and the University of Leeds, recently published, maintains the high standard of research which has characterized the previous reports, and provides an interesting and useful account of the application of science to the solution of commercial problems.

The report deals with the continuation of previous investigations, and is divided into two main parts. The first part is concerned with resin formation in benzoles; and further work was undertaken with a view to devising a test which will indicate the tendency of benzoles to resinify on storage. Experiments with the object of obtaining more intimate knowledge of the mechanism of resinification were undertaken; and, since previous work had suggested that resinification was essentially an oxidation process, samples of an alkali-washed "once-run" benzole distilled in nitrogen were stored in atmospheres of oxygen and of nitrogen. Very little resin was obtained on evaporation of the nitrogen-filled samples, but resinification of the benzole stored with oxygen continued with pronounced sludging for over eight months. It was concluded that the first step in the process was the addition of oxygen to the most readily oxidizable compounds (unsaturateds), with the formation of peroxides; and to verify this conclusion, acetyl peroxide was added to an unrefined benzole, and the residue on evaporation determined. The peroxide caused a large increase in the quantity of resin obtained, and from confirmatory tests it appears that the course of the resinification process is first the formation of peroxides, and then their further reactions with unsaturateds, giving intermediate oxidation products and finally resin.

Results of previous work (Fourth Report, 1927) showed that inhibitors, such as tricresol, if present in suitable concentrations, reduce the quantity of resin obtained, if added immediately before evaporation. Further tests were in accordance with the theory that the peroxides in unrefined benzoles were destroyed by peroxides present in the inhibitor added (tricresol), according to a well-known reaction of mutual destruction of peroxides. The quantity of resin finally obtained also depends on the presence or absence of water, the material of the containing vessel used for storage, the material of the dish from which the benzole is evaporated, and the rate of evaporation. This section of the report states that the further investigations which have been carried out in attempting to elucidate the reactions taking place subsequent to the initial formation of peroxides have met with so little success that the conclusion has been drawn that progress can be made only by starting with definite unsaturated compounds known to be present in benzoles.

The action of ultra-violet light on unrefined benzoles is next investigated further. It was hoped that a test could be devised to indicate the tendency of benzoles to resinify on storage; and, in the previous (1927) report preliminary tests had yielded promising results when a comparison was made between the quantities of resin obtained on evaporation after storage in the dark in glass, and the quantities left after evaporation after exposure to ultra-violet light in glass. Details of later experiments now given, however, show that there is an essential difference between the quantities of resin thus obtained. There is apparently an additional quantity of resin which is *specific* to the action of ultra-violet light, and does not result from storage. Some of the benzoles tested gave anomalous results, and rendered correlation of the latter more difficult. When it is remembered that a concentration of one part of tricresol in 10,000 parts of benzole is sufficient to render many benzoles completely stable on storage, and that one part in 50,000 or even 100,000 probably produces an appreciable increase in stability, the erratic character of some results is not surprising.

Since ultra-violet light was unlikely to provide a satisfactory laboratory test, and as resinification is primarily dependent on oxidation, another method of speeding-up the resinification process was examined. Briefly, the method consisted in bubbling oxygen through the benzole at a definite speed and temperature and for a standard time, so that a relatively large amount of resin was produced when the sample was subsequently evaporated. Further experiments are in progress in this connection, as the tests so far completed show that stability, as shown by the oxidation test, implies, in general, stability on storage.

The action of certain substances (in particular tricresol) in inhibiting resinification of crude benzoles containing unsaturateds, on storage in the laboratory, has been previously reported; and results of further storage tests have confirmed the possibility of preventing, in practice, the gumming of such fuels, and of utilizing them satisfactorily in internal combustion engines. It has been thought advisable to appoint an Engine Tests Sub-Committee, so that large-scale trials of a number of benzoles refined in different ways, and with or without inhibitors, can be carried out before a conclusion is drawn as to how far, and in what direction, the National Benzole Association would be justified in altering its specification. For this purpose various benzoles with and without inhibitors are being placed in store for four months, after which they will be finally subjected to engine tests and the accompanying laboratory tests. The chief advantage of the proposed "inhibitor" method of stabilizing "once-run" benzoles and other fuels containing unsaturateds is the conservation of these hydrocarbons and the avoidance of losses which their removal entails. No claim is made that stabilized fuels containing unsaturateds will be so completely satisfactory as the (acid washed) fuel resulting from complete removal of these constituents. Stabilized fuels tend to coloration, but this coloration is not related to the quantity of resinous substances present.

Part II. of the report is concerned with research carried out on the comparative absorptive efficiencies of wash-oils for benzole recovery. It is very surprising that up to the present no really comprehensive comparison has been made of the volatilities and absorptive capacities of cresol, tetralin, creosote, and gas oil, under identical conditions throughout. With this object in view, therefore, previous investigations (Third Report, 1926) have been continued, as knowledge concerning the capabilities of the oils in use at the present time was regarded as essential before examining the possibility of improving the absorptive capacities of these oils. After discussing theoretical considerations of the relation between the absorptive capacity of a wash-oil and the quantity of the oil required to scrub a given volume of gas, and of the physical characteristics of a satisfactory wash-oil, there follow the detailed experimental results which have been obtained. The dynamic method of determining the vapour pressure of the wash-oils and various benzene admixtures was used, and the accuracy of the method was checked by finding the vapour-pressure of other compounds, such as nitrobenzene and bromobenzene. In the majority of the tests carried out, nitrogen was used in place of air, in order to obviate the possibility of oxidation of the wash-oil, with consequent lowering of absorptive capacity. It is of interest in this connection to note that indications were obtained of the slow oxidation by air of some samples of tetralin with the formation of water and naphthalene. This would account for the difficulty of obtaining tetralin free from water by distillation in the laboratory.

The usual physical tests—specific gravity, distilling range, naphthalene content, viscosity, &c.—were carried out on all the oils, and for each oil the absorptive capacity—*i.e.*, the concentration of benzene in the wash-oil (grammes per 100 grammes of solution) in equilibrium with the average benzene partial pressure of coal gas (6·5 mm. mercury)—was obtained.

These results, arranged in a clear, orderly manner, and obtained with much laboratory skill and care, form a useful and interesting series which should be widely available. In addition to the oils mentioned above, a Scottish blast-furnace creosote, anthracene (green) oil, shale oil, and nitrobenzene were included in the tests. The following summary may be quoted here.

| | Absorptive Capacity. Vols. of Benzene per 100 Vols. of Absorbent. |
|---|---|
| Tetralin | 6·0–5·5 |
| Light creosote (200–300° C.) | 4·8–4·5 |
| Medium creosote (210-350° C.) | 4·5–4·0 |
| Heavy creosote (220–400° C.) | 4·0 |
| Blast furnace creosote (washed) | 4·0 |
| Green oil | 3·75 |
| Shale " | 3·0 |
| Gas " | 3·0–2·8 |

Since the tar acids present in creosote have an appreciably lower absorptive capacity than the creosotes themselves, the effect of removal of the tar acids was investigated. From the results obtained, it was concluded, *inter alia*, that the presence of tar acids in appreciable quantity lowers the absorptive capacity of a creosote, and that a creosote oil containing large amounts of high boiling tar acids has a lower volatility than an oil, *of the same distillation range*, which is free from tar acids. In the case of low-temperature tar oils additional evidence has been obtained that the presence of tar acids in considerable amounts lowers the absorptive capacity. The effect of the presence of tar acids in low concentrations is less clear, and evidently depends to some extent on the nature of the acids.

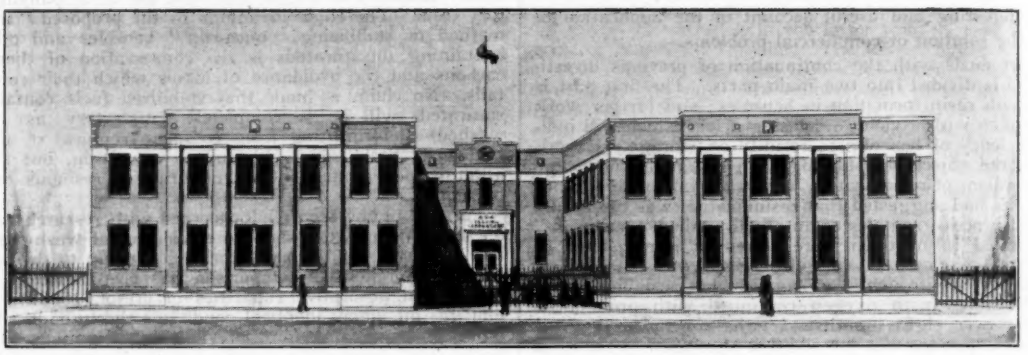
The effect of addition of naphthalene to tetralin, to blast furnace creosote, and to an ordinary creosote wash-oil was examined; and it was found that naphthalene in solution behaves normally, and has an absorptive capacity of 5·5. The addition of naphthalene to an oil of low absorptive capacity increases the latter appreciably, but this effect becomes less, the nearer the value approaches 5·5.

A partially chlorinated creosote (free from tar acids) was tried, but no appreciable increase in the absorptive capacity was effected by the chlorination; and though the product appeared to be much more stable under normal conditions than

ordinary creosote as regards thickening and resinification, decomposition with evolution of hydrochloric acid occurred at distillation temperatures.

The report concludes with a useful bibliography for 1927 of many articles of interest and patents in connection with benzole and its recovery; and a complete index to Reports 1 to 5 inclusive has been compiled, and is included in the present volume.

## NEW TESTING LABORATORY OF THE AMERICAN GAS ASSOCIATION.



The corner stone of the new $150,000 Testing Laboratory of the American Gas Association at Cleveland, Ohio, was laid with fitting ceremony on March 15. The event was witnessed by representatives of a number of gas appliance manufacturing companies in Cleveland, the Laboratory testing and office staffs, officials of the American Gas Association, and others.

Mr. R. W. Gallagher (Chairman of the Managing Committee of the Laboratory) opened the ceremony with a brief talk outlining the steps previously taken to bring the Laboratory to Cleveland and to make it a permanent institution. He paid tribute to the manufacturer company members of the Association who had been loyal supporters of the Laboratory movement, and had helped immeasurably to make it a success. The temporary quarters of the Laboratory at Plant No. 2 of the East Ohio Gas Company were established in May, 1925, and since that time a total of more than 7300 appliances had been tested and approved for public use. The new building would make available about 30,000 sq. ft. of space, as against the 12,000 sq. ft. available in the temporary quarters.

Col. Oscar H. Fogg (President of the American Gas Association) said that less than three years ago the American Gas Association selected the City of Cleveland as the location for its Laboratory for the testing and certification of gas appliances. Several factors contributed to the choice, but none more decisively than the keen interest and helpful attitude of the late Mr. Martin B. Daley and his associate and friend, Mr. Ralph W. Gallagher. Through their generous co-operation a small beginning was made in the plant of the East Ohio Gas Company, and from this had been evolved an institution now recognized throughout the land for its efficiency combined with fairness and integrity. It had been a constructive force in elevating the standards of quality and safety of the gas appliances used in the homes of America. This had been made possible by the hearty co-operation of all forces within the industry—the manufacturers as well as the gas companies—the invaluable help of agencies of the Federal Government, the wise counsel and direction of their Chairman, Mr. Gallagher, and his associates of the Managing Committee, and the devoted service of Mr. Conner, the Director, and his efficient, loyal, and experienced staff. The time had come for a permanent establishment, with a still greater field of usefulness, and they laid the corner stone in the foundation of an institution dedicated to the service of the American people.

Col. Fogg then spread the mortar under the corner stone, and the stone was lowered into position. A copper box enclosed in the stone contained, among other things, a copy of the 1924 Report of the Special Committee, headed by Mr. Harry C. Abell, to investigate the feasibility of establishing a laboratory. Also enclosed was a list of officers of the Association for the 1924-25 term, when the Laboratory was established, and a list containing the personnel of the Laboratory Managing Committee, General Requirements Committees, and the Laboratory staff.

At the conclusion of the ceremony, a luncheon was given at the Union Club by Mr. Gallagher. Brief addresses were made at the completion of the luncheon by Mr. Gallagher, Col. Fogg, and Messrs. E. P. Bailey, Jr., R. B. Harper, and W. R. Hopkins.

Col. Fogg said that it might not be known to many of the guests that the gas industry of America now had on its service mains more than 70 million persons. The national organization of this industry on the North American Continent was the American Gas Association; and its chief object was to promote and develop the gas industry and to co-ordinate its activities to the end that it might serve to the fullest possible extent the best interests of the public. The erection of the new testing laboratory was one answer to the millions of their customers that they were endeavouring to fulfil their obligation to them for the safe and efficient utilization of a product that was a vital necessity to their welfare. The fact that they had taken this step voluntarily, and had, in the words of a competent authority regulated themselves in the public interest, was a source of gratification to all who had the best interests of the industry at heart. The American Gas Association Testing Laboratory, in the final analysis, was dedicated to the users of their service. It was not sufficient that they should distribute a product that measured up to the highest standards. In obedience to the best traditions of the public service, it was necessary that the appliances for the utilization of their product be made safe and efficient, and that the entire chain of their service, in all departments, be linked together according to standards—hence the Cleveland Laboratory and its comprehensive programme.

**Ceramic Society.**—The Spring Meeting of the Refractory Materials Section of the Society will be held in Cornwall on May 3 and 4. The headquarters of the Society will be the Atlantic Hotel, Newquay. Among the papers to be read is one by Mr. G. M. Gill, on "New Developments in Gas-Works Carbonizing Plant, with special reference to Refractory Materials."

**"B.C.G.A." Fairy Gas Competition.**—This is now a well-established annual event. It is not just a guessing competition, or an advertising "stunt." It is a real educational test; and the two £50 scholarships offered in the senior section (in addition to money prizes in all sections) are awarded definitely for the purpose of assisting the further education of the winners. The judges are recognized educationists presided over by a former College Principal. The competition opens this year on April 27, and, as before, the younger children will be set a handwork task, while the elder ones will be given a written test bearing on some point of domestic hygiene and health. Children should be encouraged to enter for this sensible competition. They will enjoy the tasks set—graded to be within their capabilities, and yet sufficiently difficult to hold their interest—and the £50 scholarships are a decided help towards increasing the educational opportunities of the winners.

**Bulletin of Abstracts.**—The Bureau of Fuel and Combustion Records, Ltd., 22, Abbey House, Victoria Street, S.W.1, will publish on May 4 the first issue of a weekly "Bulletin of Abstracts," at 2s. 6d. (annual subscription £1 5s.). This will contain abstracts of articles published in British, American, and foreign journals.

**"Modern Building Construction and Road Making."**—The March issue of "Modern Building Construction and Road Making" is full of interesting matter. Prof. C. H. Reilly contributes an article on "The Cement Age," in which he traces the development of cement in architecture from the Pyramids to the present day. He predicts a more common use of concrete and steel for reinforced construction. The advantages of "Vitocrete," the rapid hardening cement for road works, where time is the essence of the contract, is evidenced by an account of the closing of Longsmith Street, Gloucester (a submain street), for four days, during which it was excavated, relaid with concrete, and opened to full traffic. The fire-resisting properties of cement and concrete are illustrated by an account of a fire that took place at Hull a few weeks ago. The concrete walls showed plainly that they were not in the least damaged, and had withstood the heat in such a manner that rebuilding operations could be commenced immediately.

# "B.C.G.A." SOUTH-WESTERN DISTRICT CONFERENCE.

## SUCCESSFUL GATHERING AT ILFRACOMBE.

**A large gathering participated in the carrying through of a particularly interesting programme on Friday, April 13, when generous hospitality was extended by the Chairman and Directors of the Ilfracombe Gas Company to delegates attending a South-Western District Conference of the British Commercial Gas Association. To the great regret of all, Mr. R. M. Rowe, C.C. (the Chairman of the Company), who was to have presided, was confined to his house as the result of an accident; but Mr. J. Armstrong (Engineer and Managing Director of the Company) and Messrs. J. Vickery and E. J. Tamlyn (Directors) devoted the whole of their attention, in his absence, to looking after the well-being of the visitors. The business proceedings were presided over, at the special request of Mr. Rowe, by Mr. F. W. GOODENOUGH, C.B.E. (Executive Chairman of the "B.C.G.A."), who was supported by Mr. W. M. Mason (Manager).**

The meeting was held in the magnificently situated Ilfracombe Hotel; and at the opening of the proceedings Mr. ARMSTRONG announced that it was at the request of Mr. Rowe that he asked Mr. Goodenough to preside over the conference.

### Ilfracombe's Generous Support.

Mr. F. W. GOODENOUGH said he deeply regretted the cause which had resulted in his taking the chair. This cause was that Mr. Rowe had a fortnight ago met with an accident from which he was only slowly recovering. He felt sure it would be the wish of all to convey to Mr. Rowe their deep regret, and their hope for a speedy and complete recovery. ["Hear, hear."] Mr. Rowe and his fellow-Directors of the Ilfracombe Gas Company had invariably given most broad-minded and generous support to all national movements on behalf of the gas industry. From the very earliest days Mr. Rowe and his Company had fully appreciated the importance of co-operative work. On more than one occasion they had subscribed twice as much to the "B.C.G.A." as they had been asked to do; and when, on the occasion of the British Empire Exhibition at Wembley an appeal was sent out for special contributions to the fund that was raised for the gas exhibit there, Ilfracombe sent rather more than twice what it had been suggested they should contribute.

### A Welcome.

Councillor F. W. HOULFORD, J.P. (Chairman of the Ilfracombe Urban District Council), then extended to the delegates a hearty welcome to the town, and gratified all present by his unstinted praise of the business methods of the Ilfracombe Gas Company. He said he felt he would be wanting in his duty if he did not make reference to the great public service rendered by the Company. During the remarkable season of 1926, just after the settlement of the general strike, there was a heavy influx of visitors; and had it not been for the foresight exercised by their excellently managed Gas Company, it would have been impossible for them to maintain a full supply of gas. There was at the time a great scarcity of coal; and the big hotels and boarding houses made enormous demands on the gas supply, which never failed them. And this was not all. In the Council's estimates provision was made for an increase in the price of gas, which it was thought was bound to follow. However, the price did not go up; and consequently there was an amount of £160 provided for in the estimates which was not required. He hoped the people of the town fully appreciated all the Company had done.

Mr. GOODENOUGH said it was very pleasing to hear this recognition of the success of the Ilfracombe Company in maintaining a supply of gas—a success which, with the exception of a few almost negligible instances, had been scored by the whole gas industry throughout a period of the utmost difficulty.

### Mr. R. M. Rowe, C.C., on the Gas Industry.

The next item on the programme was an opening address by Mr. Rowe; but in his enforced absence—an absence which it was declared had made him the most disappointed person in Ilfracombe that day—Mr. Armstrong read some notes which his Chairman had prepared for the occasion. After pointing with pride to the high claims of Ilfracombe as a beautiful health resort, Mr. Rowe proceeded: The fateful and historical year of 1926, which cost the country 300 millions sterling, was responsible for dire effects; but the pertinacity of the British race, to which we proudly belong, is proverbial, and there has been a wonderful restoration of confidence within the business ambit of Great Britain. It is generally conceded that the commercial horizon is clearer to-day than it has been for a long time past; and 1928 not only has made a good start, but has every promise of further commercial progress. There is a better spirit existing in industry, unemployment is less rife, and labour disputes are a lessening quantity. All this is to the good; and I attribute the present optimistic position to the declining fighting spirit between employer and employee, and to the growing understanding as to what Capital and Labour—the two essential parties in all productive effort—really stand for. I rejoice in these unquestionable signs of the times, which I honestly believe are pointing in the direction of a complete recovery of lost goodwill. There is a better way out of labour misunderstandings and differences than recourse to extreme and reckless tactics, from whichever side they may emanate; and I pray that the labours of the joint conference of the Trade Union Congress and the principal employers of the country, set up for the purpose of discussing the industrial problems at present facing Great Britain, will have happy and lasting results. In this connection, it is pleasing to observe that the British gas industry is represented by that stalwart and popular gas man, Sir David Milne-Watson, the Governor of the Gas Light and Coke Company and President of the National Gas Council. ["Hear, hear."]

As gas men, our minds are naturally and constantly directed to the raw material coal, without which every company would have to seek the legal process of liquidation associated with winding-up. It has been truly said that "coal is our very life blood." The clamouring cry, raised again a few days ago at Norwich, by a limited section of the community, for the nationalization of British mines—a cry now extended to Government control of coal in all its processes from the pit to the consumer—is one of those curious pieces of mentality difficult to comprehend as presenting a sound business or beneficial proposition. We are fully convinced that gas coal would become dearer, and gas prices higher, with the introduction of Government control—a disagreeable taste of which the industry experienced during the war.

The popularity of gas, with its thousand-and-one uses, continues unabated. The undertakings of the land show enormous increases in their output of gas; while the secondary products—though subject to fluctuation of prices, and sometimes to fits of extreme depression in that respect—remain valuable factors in the world's successful commerce. I am glad to re-assert my pronounced faith in the unchallengeable value of the primary commodity manufactured by the gas undertakings of Great Britain, which continues so firmly to grip and serve the domestic and commercial world; and I am convinced that gas will continue to hold its own amidst, sometimes, the carping criticism of a jealous faction. If I refer once more to the increase of output throughout the country, it will only be to say that practically every family in an area of gas supply is using gas for some purpose, which is a wonderful fact to acclaim. Marching in the fold, and as a unit of this great and powerful industry, the Ilfracombe Gas Company, of which I have the pleasure of being Chairman, has successfully progressed from year to year, until to-day it is making just under 100 million c.ft. per annum, which, for a Company of modest pretensions such as ours, my colleagues and I are proud to regard as a matter for considerable gratification. Our local output has increased by leaps and bounds; and with this march we have established in our area, as others also have done, a condition of confidence and goodwill between the suppliers and the customers who use the commodity. This state of things happily is fostered by the industry generally, and not the least by the administrators and officials of the Ilfracombe Gas Company.

The present price of Ilfracombe gas is 11d. per therm; but the cheapness of gas is not the only point to be considered by a Board of Directors, by a Managing Director, or by a Gas Engineer, in the discharge of the duties cast upon their undertaking by Statute. The gas must be good. It has been humorously, but intelligently, said that it is not always wise to wear the cheapest boots, or to smoke the cheapest cigars. It is the constant aim of my Company, as it is the aim and desire of other undertakings, to supply consumers with a gas of the best description and value. But as omelettes cannot be made without eggs, so coal must be of the proper quality for successful carbonization; wages must be fair to the employee as well as to the employer; efficiency and the health point of view must ever be kept in sight; and, not the least important, stockholders must be paid reasonable dividends on their investments. Apropos of the basis of charge for gas, I have cursorily glanced, with much interest, at the report of the Committee on Gas Charges, of which Committee Mr. Goodenough was a member. For the present the report is private and confidential—or, at any rate, has not been published—and I will therefore only now say that the important conclusions arrived at by the Committee, the members of which were unanimous, will demand, as I am sure they will receive, very close and vigilant consideration by the whole industry.

Before I speak to you, as I propose to do, though briefly, of the very valuable work of the "B.C.G.A.," I would like to

make passing references to one or two pleasing and not unimportant incidents which directly or indirectly concern the gas industry. A few weeks ago Mr. Goodenough—that pronounced vitalizer of the industry, whose presence at a gathering like this is always inspiring—had the signal honour of deputizing for Lord Burnham, and in that capacity of occupying the chair at a function held under the auspices of the Incorporated Sales Managers' Association, of which, incidentally, Mr. Goodenough is the esteemed Chairman. At this function the Duke of York delivered himself of a speech, which should be read, marked, and inwardly digested by every member of the "B.C.G.A." The Duke of York's message was to the nation, but at the same it was also a striking message to the British gas industry. He said: "What is wanted is the best men for both functions (*i.e.*, for production and selling), and complete co-operation between them—the complete realization by each of the importance and difficulties of the other. Supply without demand is of no value; output which cannot be sold profitably is not an asset, but a liability; make without marketing spells bankruptcy." Mr. Goodenough on the same occasion said: "Without efficient salesmanship efficient production must fail to achieve its full and fitting reward." The words of the Duke of York and those of the Chairman which I have quoted, in language culled from the March "Bulletin" of the "B.C.G.A.," should influence not only the Association of which we are members, but the whole of British industry. I leave the two pregnant statements I have quoted for close and complete application by you, as well as by myself, in the discharge of those duties for which, as members of one of the most important British industries, we are individually and collectively responsible.

Then may I be permitted to congratulate The Institution of Gas Engineers, of which many of you are members, on their proposal to petition for a Royal Charter, and to be incorporated under their old and familiar title? I have read with much pleasure the speech which Mr. H. D. Madden, the accomplished and popular Engineer and Manager of the Cardiff Gas Light and Coke Company, made in London a few days ago; and I am sure it will be the earnest hope of the entire gas industry that the application will meet with the success it undoubtedly deserves, and to which it is entitled, at the hands of His Majesty in Council.

Now I desire to refer to the claims and aims of the Association under whose auspices we are gathered to-day. If my observations are outspoken and spiced with ultra-candour, believe me they are prompted solely and exclusively in the best interests of the industry in which we are all so vitally concerned. It would be both improper and unnecessary for me to remind this conference of the sheer necessity for the existence of the "B.C.G.A." The wonder to me, as a country Gas Director, has always been that its genesis was so long delayed. We owe an everlasting debt of gratitude to those responsible for its inception. The progress the Association has made during the sixteen years of its existence has been truly remarkable; and to-day its objects are vitally indispensable to the success, well-being, and life of the gas industry. I say this apart altogether from the important place the Association occupies, for instance, in relation to the ever-pressing subject of conservation of coal, and to the function it successfully discharges of informing the public of the beneficial use to which the products of our industry can be applied. The question I wish to put to you, and which I submit with all the emphasis at my command, is: Are you individually and collectively recognizing to the full the inestimable value and potentialities of the Association, and do you realize the yet greater value and the larger potentialities of which the Association is capable? I am sceptical as to what the answer to that question, if made honestly, would be; and I am not sure whether completely the answer could be in the affirmative. I am not, however, inviting you to answer to-day the question I have ventured to put. I would rather bid you on your return to your Boards, to think about it and discuss it; and if, in the result, you and those you represent are completely satisfied that you all have done, and are doing, the best that lies within your power not only to maintain, but to increase, the utility and service of this great and valuable organization to which we belong, I shall owe you an apology which I will gladly extend for my present presumption. It is impossible that we should sink back and accept the *status quo* of 1911, or even of modern years; and on behalf of my Company, realizing, as my colleagues and I do, the present-day necessity for the still greater development and extension of the gas industry, and the equally important necessity for safe-guarding its interests in the face of a growing competition, I do most earnestly suggest that a still greater increase in the basic rate of joint subscription to the funds of the Association should, and could, be made by the smaller gas undertakings of the kingdom without detriment to themselves or to their consumers. Every gas undertaking in this connection should inculcate a spirit of unselfishness, spiced with liberality and a large measure of conception, because it would be fatal to the best interests of the industry if the "B.C.G.A." at any time experienced the hell of an empty purse.

Let me conclude by remarking, not by any means in a pessimistic mood, that it is admittedly the predisposition of many organizations to become set and rigid. Founded to express life, even powerful institutions sometimes end by throttling that life. They must of necessity undergo constant criticism, perpetual re-adjustment, and periodical renewing, if they are to remain vital. The British Commercial Gas Association is no exception to the truth of this statement. Let it be one of the most hopeful things of the future that we open the doors of the British gas industry to criticism, however merciless that criticism may be. We must be capable of meeting and combating it; and I believe we shall continue successfully to do so. With the present activities of electricity, however, let us remember that we are in a situation that is searching to the core. As an industry we possess reality; and we are believers in our destiny. Without presumption, we declare the gas industry to be indispensable to the community; but this declaration involves a great ideal, and it is the duty of every member of the industry unceasingly to live up to it.

### Acknowledgment by the Conference.

Mr. W. E. Dean (Exmouth), proposing a vote of thanks to Mr. Rowe, said that his great work for the industry was fully realized in that part of the country. The interest he took in the "B.C.G.A." was invaluable. The strongest point about their service was "consistency," in all respects. They must prove to the public that they were out to give them service, and to offer them a "square deal;" and in this connection it was a pleasure to find, on visiting different towns, that the gas managers there were so generally popular. The utmost interest on the part of Directors and members of Gas Committees was necessary to the realization of the utmost possibilities of the "B.C.G.A."

Mr. S. J. Ingram (Truro) seconded the vote, and voiced their grateful appreciation to Mr. Rowe for his inspiring address. A note of sincere conviction ran through the whole of his remarks.

Mr. Goodenough remarked that it had always seemed to him that one of the really important services which the "B.C.G.A." had rendered to the industry had been the bringing into their deliberations of the Chairmen and Directors of the gas undertakings of the country. Prior to its formation, there was no organization which brought into close association with the officials of the industry, and into co-operation with them, the Chairmen and Directors of companies.

### Mr. W. N. Westlake's Illness.

Mr. Goodenough then expressed regret at other absences, and particularly for the reason why Mr. W. N. Westlake (Engineer and Manager of the Exeter Gas Light and Coke Company) was unable to be with them. Mr. Westlake was lying on a bed of sickness, having been dangerously ill with pneumonia. However, he (Mr. Goodenough) had had a message from Mrs. Westlake two or three days ago, in which she stated that her husband had passed through the crisis, and that his condition was quite good. They would all join in sending Mr. Westlake their best wishes for a speedy and complete recovery. It was a matter for regret, too, that business engagements prevented the attendance of Mr. Madden, of Cardiff, Mr. Halliwell, of Bristol, and Mr. Dawson, of Torquay. As an interesting personal matter, Mr. Goodenough mentioned that that day was less than a month short of forty years since he left Newton Abbot to go to London to join the service of the Gas Light and Coke Company.

### Mr. F. W. Goodenough, C.B.E., on National Publicity and Propaganda.

Mr. Goodenough, as "B.C.G.A." Executive Chairman, proceeded to address the conference on the work and policy of the Association. The work, he said, took several forms; but the primary purpose for which the Association was founded was that of conducting co-operative publicity on behalf of the industry. The object of national publicity was to keep before the public the fact that the gas industry was a live and progressive industry, continually growing and advancing in the service of the community, and not in any way a dormant or doomed industry. To-day it was more alive than ever; and it was their object as an Association to keep this in the public mind, to create the right atmosphere in which to conduct their business, and to maintain their prestige as an industry. As a matter of fact, the Association performed a vital function, because in these days of ever-increasing publicity, unless a business or industry lifted up its voice, and made itself heard, the struggle must become a hopeless one. But in addition to its more or less indirect effects, this national publicity work resulted (as was proved by extracts he read from one day's postbag at "B.C.G.A." headquarters) in direct business to gas undertakings in all parts of the country. National publicity had always another important side—that of maintaining a friendly relationship with the Press of the country. A great deal was constantly being done to keep the Press accurately informed upon gas matters, and to prevent them "straying from the right path." One could not have too many friends in business; and one could not afford to have any enemies. Indeed, among the most important functions of the gas manager, as salesman to his undertaking, was that of creating

friends all round him among his public; and the "B.C.G.A." did all it could to create friends for the industry as a whole.

In the next place, he wished to emphasize what Mr. Rowe had said about the necessity for more funds for publicity, if the gas industry was to progress. Members would, he said, shortly receive an appeal for subscriptions on a basis of 6s. per million c.ft., which was to be divided, according to their needs, as to 1s. 7½d. for the National Gas Council, 7½d. for The Institution of Gas Engineers, and 3s. 9d. for the "B.C.G.A." This allocation had been decided upon after full consideration by a General Finance Committee representative of the three bodies. Now, in addition to this 6s., members—particularly company members—were going to be asked to subscribe a further 1s. 6d., the whole of which would go to the "B.C.G.A." to be expended on publicity work in the districts from which the extra money came. Several companies had already promised this full 7s. 6d.; and he believed that ultimately every company and many corporations in the country would do so. The whole of the additional 1s. 6d. would be spent on newspaper publicity; and this would mean that, if all the members paid the extra subscription, the Association would be able to increase its newspaper advertising by 50 p.ct.—a very important consideration.

Of course, what the Association did in the way of national and district publicity required to be backed up as well by local publicity on the part of every gas undertaking; and he was very glad to notice in all directions that this was being done. Then, as Mr. Dean had remarked, publicity had to be followed up by consistently good service and a "square deal." The latter he would describe as accurate quantity, good quality, reasonable price, and reasonable profit. The consumers must be satisfied on these four points—the "ps" and "qs" of gas supply. The "B.C.G.A." had talked service all the years of its existence; and the need for good service was becoming more and more recognized. They had, however, still a long way to go in the industry as a whole before service to the public was anything like 100 p.ct. perfect. It was the other man's point of view that they had to consider the whole time. A grumbling consumer must not be regarded as a nuisance, but as an opportunity. In his own Company they did not consider that a dispute was quite satisfactorily settled unless they got an order. This was a high ideal at which to aim; but it was remarkable how often one could obtain business out of a dispute, if it was properly handled. No opportunity of getting into contact with a consumer and explaining the possibilities of gas service should be despised; and this was frequently afforded by a dispute, when it could not be secured in any other way.

His own opinion of the future of the gas industry was a most optimistic one; and he regarded as extremely encouraging the attendance at that conference, from all parts of the West Country, to discuss their problems. It was the manifestations of this considerable and growing interest that gave him his feeling of optimism, because it was only when every gas manager realized that the selling side was the most important side of the gas industry that they would achieve the tremendous advance which he was certain they were destined to make in the near future. He believed the gas industry was really only at the beginning of things. It had, of course, already achieved a great advance; but there was a very much greater advance opening up before it because of the increasing interest the industry was taking in the commercial side of the business. They could be optimistic so long as they were not complacent—so long as they were not satisfied with what they had done. The "B.C.G.A." were far from satisfied with what they had done. They regarded themselves as beginners, with a great deal more to do as they grew in experience, and as the members supported them more and more in their efforts. But while they were not complacent, they could be confident—confident that, if they did their utmost to be efficient, and to conduct their business as first-class business men, they would have before them in the service of the community a very great future. This was the message that he, as head of the Executive of the Association, brought them that day—a message of optimism based upon a determination to do their very best as an Association in the service of the industry, and as an industry in the service of the nation.

### POINTS ARISING OUT OF THE ADDRESS.

Mr. J. TAYLOR (Weston-super-Mare), though he did not regard the efforts in the way of propaganda recently put forward by the coal merchants as likely to be attended with any great success, said it would be interesting if Mr. Goodenough could tell them something as to the views of the Executive regarding the best means of combatting the rather insidious advertisements that had been put out by the Coal Merchants' Association.

Mr. GOODENOUGH said he felt that the best thing to be done was to increase their own propaganda pro gas, without taking any notice of the attacks upon them by the coal merchants. The public had already had far too great an experience of gas to believe the things the coal merchants were saying about it. This was the view of the Executive on the matter.

Mr. W. H. BENNETT (Redhill), who is a member of the General Committee, referring to the increased district publicity which is to be secured by means of the additional 1s. 6d. per million c.ft. subscription, suggested that it might be an advantage if this were undertaken in co-operation with the local company or companies concerned.

Mr. F. LEE (a Director of the Bideford Gas Company) said he thought the press matter sent out by the publicity department of the Association was of a very high order, and he wished to compliment them upon it.

Mr. J. E. NORMAN, J.P. (Chairman of the Weston-super-Mare Gas Company), proposing a hearty vote of thanks to the Chairman, remarked that the propaganda work of the industry was in able hands. His own Company would be very glad to follow the lead of Ilfracombe and other undertakings in guaranteeing the increased subscription of 7s. 6d.; and he hoped the companies in the district would follow them, so that in time it might be possible to say there was not a single undertaking in the West Country that was not on the increased basis.

Mr. J. H. CORNISH (Bridgwater) seconded the vote, and commented upon the stirring character of the address they had just had from the Chairman.

### FACILITIES FOR EMPLOYEES.

Mr. GOODENOUGH, in the course of his acknowledgment, pointed out that good service necessitated good men on the staff; and, as they all knew, the "B.C.G.A." was endeavouring to assist in the creation of good salesmen by the organization and working of the Salesmen's Circles, which he believed were doing very good work throughout the country. The Institution, too, through its Education Scheme, was doing its part in the creation and development of good men. The "B.C.G.A." was in the closest touch with this education work, for as a matter of fact he happened to be Chairman of the Education Committee as well as Chairman of the "B.C.G.A." Executive. The two were working together for the provision of what was so essential for the industry—well-informed competent men, to serve their undertakings by serving the public. He appealed to all present to do what they could to support the Salesmen's Circles and the Education Scheme. In widespread areas difficulties arose from the distances men had to travel; but he urged Directors and Managers to offer all possible facilities to their employees to become properly trained and educated for the important work of representing the gas industry.

### LUNCHEON.

The morning session completed, members were the guests of the Chairman and Directors of the Ilfracombe Gas Company at luncheon in the hotel. Mr. Armstrong was in the chair, and was supported by two other Directors—Mr. J. Vickery and Mr. E. J. Tamlyn. After the Loyal Toast,

Mr. J. E. NORMAN proposed the "Ilfracombe Gas Company," and thanked the Chairman and Directors for the extremely hospitable manner in which they had received the visitors. For some years he had watched the progress of the Company, and found that its work was done extremely well. They congratulated Mr. Armstrong upon the position to which he had brought the Company.

Mr. ARMSTRONG, responding, said he was in the unhappy position of having to act as a substitute for his Chairman, Mr. Rowe, who had been looking forward to this day for a good many months, and had undertaken all the arrangements that could be made for ensuring the success of the conference. The Ilfracombe Gas Company was at all times ready and willing to pull its share in the boat where the gas industry was concerned. It was prepared to go "all out" to maintain the dignity and the prestige of the profession, and to afford the public that which was expected of it—namely, good service.

Mr. VICKERY (who said he had been associated with the Gas Company for fifty years, and had been a Director for about fifteen years) and Mr. TAMLYN also acknowledged the toast. In the course of his speech, Mr. Vickery made use of a good slogan, by saying: "The best you can do for your customer is the best you can do for yourself."

Councillor F. W. HOULFORD submitted "The Gas Industry," and again made reference to the public-spirited manner in which the Ilfracombe Gas Company had treated the town. The Company had, he declared, never abused the position in which it found itself. He was glad to be able to couple the toast with the name of a Devonian from the headquarters of the industry.

Mr. GOODENOUGH, in reply, said he was proud to be associated with the gas industry, and equally proud of being a Devon man. The gas industry was not merely a money-making concern, but performed a really great public service by conserving the health and the wealth of the people of this country. Gas had brought about a great revolution in the homes of the people. In the last quarter-of-a-century it had been installed in between 4 and 5 million artisan homes in the British Isles, and had resulted in immeasurable benefit to the occupiers of these homes. In addition, it had brought about an enormous improvement in the atmosphere of the towns. Thus it was an industry to which anyone might well be proud to belong. ["Hear, hear."] While they all so deeply regretted the absence of Mr. Rowe and its cause, they were glad, failing his presence, to have in the chair at that luncheon their good friend Mr. Armstrong, who was all that one would wish a man to be.

At the afternoon session, Mr. Goodenough again presided, and the following paper was read.

## GAS SERVICE IN RELATION TO HEALTH AND HYGIENE.

By J. ARMSTRONG, Engineer and Managing-Director of the Ilfracombe Gas Company.

If the old proverb "Cleanliness is next to Godliness" be true, the gas engineer may be termed a missionary of cleanli-

ness, if not of Godliness; and my colleagues in the West may still have hope that their future is more firmly established than others would have us imagine.

Among the many questions of the day, the pollution of the atmosphere by smoke is one of the foremost. We who live in Ilfracombe and similar towns do not suffer from this menace, but we greatly sympathize with those who are compelled to live in cities and towns impregnated with this deadly and unnecessary evil.

### Cooking.

These are strenuous days, and it is essential that the health of the community should be safeguarded. It is certainly our duty to do all possible towards attaining this end. We know that there are a thousand-and-one uses to which our commodity, gas, can be applied; but in this and similar towns the "industrial consumption," as commonly understood, is a very small proportion of the whole. We nevertheless have an industry; and as Ilfracombe is a health resort, we may claim that our particular industry might appropriately be called the "health industry." The requirements, therefore, of such places compel undertakings like ours to adopt and adapt in every possible way labour-saving appliances which make for an easy and contented life. This is particularly so in "the woman's workshop"—the home. Upon one point we are, I am sure, all agreed—namely, that dirt must at all costs be avoided—and efforts towards this end should be directed to eliminate, as far as we are concerned, the habit of burning raw coal, which is both wasteful and unscientific. We should certainly endeavour to replace coal appliances by those in which smokeless fuel is burned. In the advocacy of the use of gas in the kitchen, it is desirable that the apparatus to be used is such that it will give the highest efficiency at a reasonable cost; and I think the public generally will agree that the modern gas cooker is a much better appliance, as regards both efficiency and economy, than it has ever been, and, moreover, that, with an enamelled finish, the cleansing of it, so far as labour is concerned, is reduced to a minimum.

The fact that perfect regulation when cooking in a gas cooker can be secured makes for a much easier and better time for those responsible for the cooking arrangements; and whereas the kitchen of the past might be truly described as a "modified Turkish bath," the atmosphere of the all-gas kitchen is not only more healthy and cleanly, but gives brighter and happier conditions—most essential for health.

It is interesting to recall that witnesses before Lord Newton's Smoke Abatement Committee almost without exception condemned "the old-fashioned kitchen range as inefficient, wasteful of fuel and labour. The simplicity of cooking by gas and the utilization of gas by an automatic meter in the houses of the people will enable the children of to-day to apply in their homes the knowledge acquired in the schools."

As to the hygienic safety of gas for cooking, there cannot be any possible doubt; and I should like to repeat a statement made by Mr. A. H. Barker, B.A., B.Sc., the eminent Heating and Ventilating Engineer, dispelling the fallacy of contamination: "The outstanding merit of gas as a fuel for cooking purposes is that, owing to its combustibility and the innocuous character of its products, the heat can be generated quite close to where it is absorbed by the food directly from the products. Hence the amount of heat lost can be kept low, and the efficiency correspondingly high."

As long ago as 1907, the "Lancet" issued an official report on cooking by gas which also completely disproved the possibility of food contamination in gas cookers.

The gas cooker avoids all the trouble of lighting fires, carrying coals, and, when the cooking is finished, of clearing-away the ashes; and in addition there is flue cleaning—a trying occupation to most people.

### Hot Water.

It cannot be too strongly emphasized that a good and efficient hot water supply is an indispensable feature of the home. Every day hot water is required at some time or another, and the provision of this without resort to laborious effort is desirable. It may be argued that gas is more costly than solid fuel; but in the majority of homes hot water is required intermittently and with suitable apparatus it can be obtained at a reasonable cost.

The gas copper has many uses other than that of laundry work, and the geyser when properly fitted is a very efficient and economical apparatus. It provides a hot bath at any time of the day or night with no trouble and at a low cost. There are many other varieties of water boiling appliances suitable to the different types of houses and to varying needs; and I am confident that the staff of any gas undertaking will be most happy to advise on the best methods and appliances.

In this town instantaneous hot water supply is a necessary requirement in the hotels, boarding-houses, and cafés during the rush hours of the holiday season. The fact that those directly concerned realize that they can have at a moment's notice a full supply of boiling water without undue strain on the staff is a distinct help, and makes for good management.

### Refrigeration.

May I also refer to the latest use to which gas is now being applied—namely, that of refrigeration? The proprietors of hotels and boarding-houses are having their attention directed to the Regulations that come into force on July 1 next prohibiting the use of preservatives in food. The efficiency of the gas apparatus designed for refrigeration has been tested in our showrooms, and the appliance has been found to give excellent results. The running costs are moderate and little or no attention is required.

### Heating.

The climate of this country almost compels us to have in our homes the means of providing heat at short notice; and while the provision of heat is the primary function of the domestic fire, it is not the only one. It is an aid to ventilation. It must, however, be admitted that there are a large number of houses not equipped with gas fires, and that there remains a prejudice against them.

I am not going to apologise for repeating the statement so often made that the highest consumption of gas per acre in any residential district in these Isles is in the area occupied by the leading physicians and surgeons. May I suggest that doctors would not use gas fires if they were at all unhealthy? We in the gas industry probably have ourselves to blame for many of the complaints made against gas fires, due to incorrect fixing, want of attention, and also, perhaps, lack of courage in advising consumers to scrap obsolete apparatus.

The earlier types of gas fire were certainly associated with a characteristic and irritating noise, due to the roaring bunsen flame and the hiss caused by the flow of gas at high velocity. These defects have now been eliminated by the introduction of special burners, and ventilation second to none is obtained by the modern gas fire, provided it is properly fixed.

The results and experiments now being undertaken in relation to the properties of radiant heat in regard to the effect on the human body are certainly interesting, and will, we hope, have far-reaching effect in assisting towards the elimination of disease. While the information on this is not yet plentiful, we are hopeful that a gas fire will be put upon the market before long which will have a definite therapeutic value, as well as providing congenial warmth in which the "scorching" effect will be materially reduced. The increasing use of modern gas fires in the hospitals and nursing homes of this country is further testimony to their efficiency and hygienic superiority over other forms of heating, apart altogether from the indirect saving effected on the wear and tear of the surrounding furnishings.

We still occasionally hear that the air in a room with a gas fire is "dried up" as a result of its use, by which it is meant, presumably, that it is overheated, and that the relative moisture content in it is reduced. This is not so, for it has been proved beyond doubt that a gas fire of the modern type, properly fitted with a suitable flue, ensures an equable temperature.

In holiday resorts the comfort of visitors in hotels and boarding-houses is enhanced by the equipment of gas fires, with automatic meters, in their rooms. It often happens that guests are caught in a surprise downfall of rain, or there may be a chilly night during the holiday; and if a gas fire is available at a moment's notice, garments can be changed and dried, and physical comfort is ensured.

### Lighting.

So far as gas lighting is concerned—and I have no desire in any way adversely to criticize electricity—I do not think I am overstating the case when I say that gas is by no means inferior to electricity from a hygienic standpoint. This has on many occasions been proved by scientific tests. The relatively small amount of gas which is required by the modern incandescent burner to illuminate a room adequately is such that, if the room becomes overheated or stuffy, it is, I suggest, due entirely to the fact that it is not properly constructed or ventilated. Incandescent gas light is excellent for the eyes. Of all artificial sources, it most closely approximates the light of the sun, and it is free from glare.

### Discussion.

Dr. D. C. Adam (Medical Officer of Health for Ilfracombe) opened the discussion, and congratulated Mr. Armstrong upon his paper. He pointed out that, with proper fittings and efficient ventilation, no possible harmful effect could arise from the use of gas in the house.

Mr. Goodenough said that in his Company's district there were nearly 4000 doctors who, from their own experience, were convinced users of gas fires. When his Company set out nearly twenty years ago to prove to the medical profession that gas could be used, not only without detriment to health, but with advantage to it, the proportion of doctors using gas was comparatively small. To-day they used it almost universally, because the Company had given them an opportunity of experimenting in their own houses and surgeries. They had put in thousands of fires for doctors in their district, and had never had to take one out again. At Westminster Hospital there had been put in over 250 gas fires.

Mr. W. M. Mason said the gas industry might be old-fashioned, but it held all the potentialities of the very newest things. It was the case with some things that the older they got the more valuable they became. Practically every home in the land now used gas for cooking, where a supply was available. Gas "did the job," and it did it effectively. Not only the hospitals of London, but practically all the latest hotels and restaurants used gas in one way or another.

Mr. Goodenough remarked that the Gas Light and Coke Com-

pany's largest consumer, who were a well-known firm of hotel, restaurant, and tea-shop proprietors, used three times as much gas as the Ilfracombe Company supplied. This was good testimony to their opinion of the value of gas as a fuel.

Mr. CHOPE (Bideford) did not think one word too much had been said in favour of the most useful commodity they had ever had in their houses, and one of the cheapest.

Mr. DELVE (Combe Martin) congratulated both Mr. Armstrong and Dr. Adam upon the views they had put forward. He also thanked the Ilfracombe Gas Company for the manner in which they had served their customers during the troublous times of the coal strike.

A hearty vote of thanks was passed to Mr. Armstrong and the various speakers, on the proposition of Councillor H. WILLETT HUXHAM (Bideford), seconded by Mr. LEE.

Mr. ARMSTRONG, in responding, mentioned that the highest consumption of gas in any period, so far as the Ilfracombe Gas Company was concerned, occurred between 12 and 3 p.m. on the second Sunday in August of each year.

Tea in the hotel lounge, at which Mrs. Rowe acted as hostess, brought a most profitable and enjoyable day's proceedings to a close.

# BUILDING EXHIBITION AT OLYMPIA.

**April 13 to April 26.**

This biennial fixture has been found to be of great service in the past in introducing new processes and enabling the building industry to discuss matters of importance to the trade; and the fifteenth exhibition of the series, which is now being held at Olympia will prove no exception to the rule. No less than 400 exhibitors fill the whole of the space of the main building and the new hall; and there is much to interest the architectural and engineering professions, as well as contractors, builders, and everyone concerned in the erection and decoration of houses. In addition to the things essential to the actual building of houses, there are shown a large number of articles which contribute towards material comfort in all kinds of buildings. The numerous types of labour-saving and up-to-date contrivances, and everything that goes to make a house beautiful, should prove particularly attractive. The exhibition was declared open on Friday by Mr. Walter Tapper, A.R.A., President of the Royal Institute of British Architects.

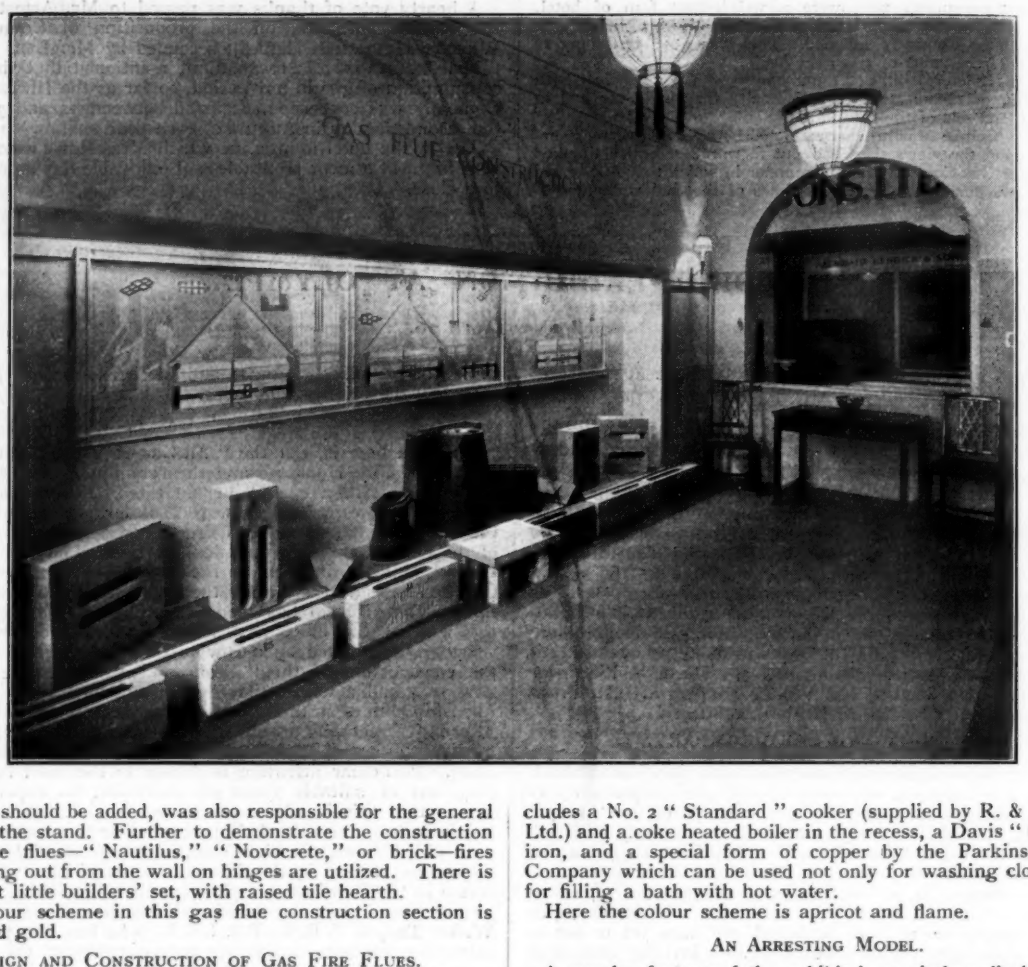
## GAS LIGHT AND COKE COMPANY.

Again the Gas Light and Coke Company have recognized, and made the most of, an exceptionally good opportunity to draw the attention of architects and builders to the "proper use of gas"—which is only too often an entirely different thing from the mere "use of gas." They have staged a display that is essentially utilitarian, but at the same time extraordinarily artistic. It will not suffer by comparison with anything else that is to be seen in the exhibition. If, for example, a better lighting effect is to be found, we have yet to see it. Compactly arranged on an island site, and inviting inspection while affording sufficient seclusion to permit of close study, are three rooms—office, lounge, and kitchens—and in this order they may be briefly dealt with.

### "ECONOMY" GAS FLUES.

The idea here is, not the "All-Gas House," but the "One Solid Fuel Fire House;" and the very practical suggestion is made that, with a coke boiler in the kitchen to provide the domestic hot water and to serve radiators in the hall and on the landings, the use of gas fires for warming the remainder of the house becomes economical, as well as convenient. And this, of course, brings one to the question of how best to show the architect and the builder the right method of constructing flues. The problem has been admirably solved by placing on the wall of the office a series of five large drawings (excellently illuminated by a row of concealed lights) indicating the construction of the "Economy" gas fire flue which is now so popular with builders all over the country, and also furnishing hints as to how to deal with the one coal fireplace. Alternative methods are clearly set out for obtaining satisfactory ventilation of gas fires, together with saving in building costs. Particular attention is drawn to the need for the employment of suitable types of terminals, as experience has shown that this is where trouble may arise. But the object has been to make the whole process clear from start to finish, and with this end in view samples of the special flue blocks which are utilized in the different forms of construction illustrated in the drawings are placed on a ledge below. It should be mentioned that the drawings have been produced by Mr. Walter Tapper, A.R.A., P.R.I.B.A., who has also prepared an attractive brochure containing reproductions of the drawings, with letterpress description for the guidance of builders. Mr.

THE GAS LIGHT AND COKE COMPANY'S STAND.



Tapper, it should be added, was also responsible for the general design of the stand. Further to demonstrate the construction of gas fire flues—" Nautilus," " Novocrete," or brick—fires which swing out from the wall on hinges are utilized. There is also a neat little builders' set, with raised tile hearth.

The colour scheme in this gas flue construction section is apricot and gold.

### Design and Construction of Gas Fire Flues.

In the brochure already referred to, Mr. Tapper points out that, though existing by-laws (based on natural laws) enforce the correct construction of coal fire flues, there are at present no by-laws relating similarly to gas fire flues; and in their absence, he suggests that the following notes should provide a useful guide to all engaged in the design and construction of such flues:

(1) The cavity of a hollow wall must not be used as a flue for gas fires unless a suitable shaft is properly constructed therein. If smoothly finished, the size of the flue for the smallest gas fire need not exceed 20 sq. in. in area.

(2) All flues for built-in gas fires must discharge into the outer air above the main ridge of the roof.

(3) Each gas fire must have its own independent flue, which throughout its entire length must not be connected with, or run into, any other flue.

(4) The flue may be constructed in either brick or concrete block. Parging is not necessary, but the interior should be carefully trowelled, and kept clear of all mortar droppings.

(5) The gas fire should not discharge immediately into the flue shaft, but an opening rather greater than the full width of the fire outlet should be gradually (not abruptly) gathered over (as is done in the case of a coal fire), providing a products-of-combustion chamber above the gas fire outlet corresponding with the smoke chamber which is always constructed above a coal fire.

### The Lounge.

The lounge, which is decorated in blue and gold, shows the architect just what can be done by gas in the best style of rooms. On one side is an antique brass Davis " Anthony " fire, and on the other a Wright " Vandyke " in antique copper. Both have massive marble surrounds. Tables provided with the latest form of reading lamp, in the shape of powder blue and gold vases (and silk shades to match), together with a royal blue pile carpet complete a truly luxurious apartment.

### Gas Kitchens to Suit all Pockets.

Another good idea has been the fitting-up of two kitchens—one suitable for houses costing anything above £1000, and the other for houses costing up to this figure. The equipment of the former comprises a John Wright newest pattern gas cooker, with " Regulo " control, a Potterton combination set for the hot water, an " Eco-Dry " cabinet, and an " Electrolux " refrigerator. The one for the cheaper type of house includes a No. 2 " Standard " cooker (supplied by R. & A. Main, Ltd.) and a coke heated boiler in the recess, a Davis " Crystal " iron, and a special form of copper by the Parkinson Stove Company which can be used not only for washing clothes, but for filling a bath with hot water.

Here the colour scheme is apricot and flame.

### An Arresting Model.

A popular feature of the exhibit is a window display model for demonstrating the smokeless house. There are the coke heated boiler and gas cooker in recess. From the boiler hot water is taken to radiators in the hall and on the landing for partial central heating; and the domestic hot water supply is drawn from the same source—the storage being arranged in an airing cupboard in the bathroom. The flow and return pipes are taken to the bath, lavatory, and sink. By an ingenious system of glass piping and lighting effects, attention is drawn to the rapid circulation from the coke heated boiler to all the points mentioned. At the same time, gas fires of the latest types are shown alight in the sitting room and bedroom.

This is a model which has already been found extremely effective in the Company's eastern showrooms in connection with the special coke campaign in that area.

### Remarkably Effective Lighting.

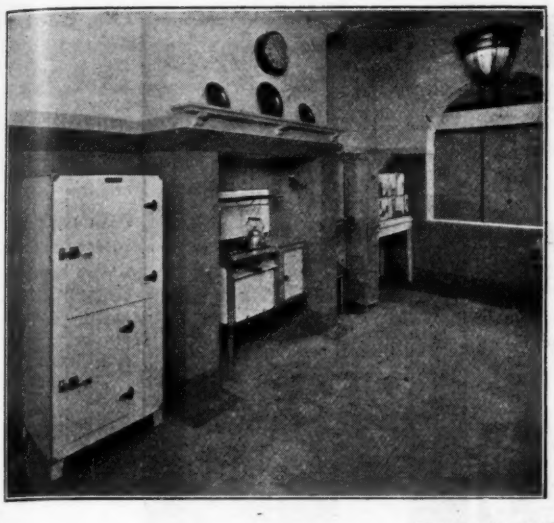
Reference has alrea y been made to the remarkably effective lighting of the stand. On the outside there are fourteen handsome lamps by Evered, to Mr. Tapper's design, of Florentine pattern, in bronze and cathedral glass. These in themselves are amply sufficient to draw the visitor to the exhibit. Inside, the illumination, which is by means of Sugg ventilating lamps, is no less effective. These ventilating lights are totally enclosed by silk shades which form part of the colour scheme. The Gas Light and Coke Company use a special ceiling holder, with bayonet fitting, which carries the silk shade. This enables the shade to be easily removed, and at the same time prevents any light from filtering between ceiling and shade. It is found that the silk does not offer any resistance to the free passage of air, so that efficient ventilating effect is secured.

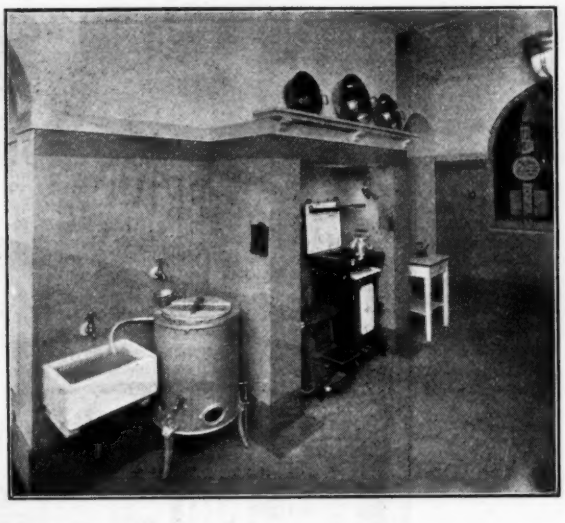
## SOME OTHER EXHIBITS.

### Nautilus Specialities.

In close proximity to the stand of the Gas Light and Coke Company is another which calls for close scrutiny on the part of the architect and builder. This is the display of the Nautilus Fire Company, Ltd. (Proprietors, the Davis Gas Stove Company, Ltd.), of 60, Oxford Street, London, W.

Here is to be seen a practical demonstration of Nautilus cast-concrete " Economy " flue block construction for use with gas fires. As is well known, this system is intended primarily for those cases where heating by gas (or by some alternative means to solid fuel) has been decided on before the erection of a building. It involves the use of a series of cast concrete blocks, which, built into the thickness of the walls, take the





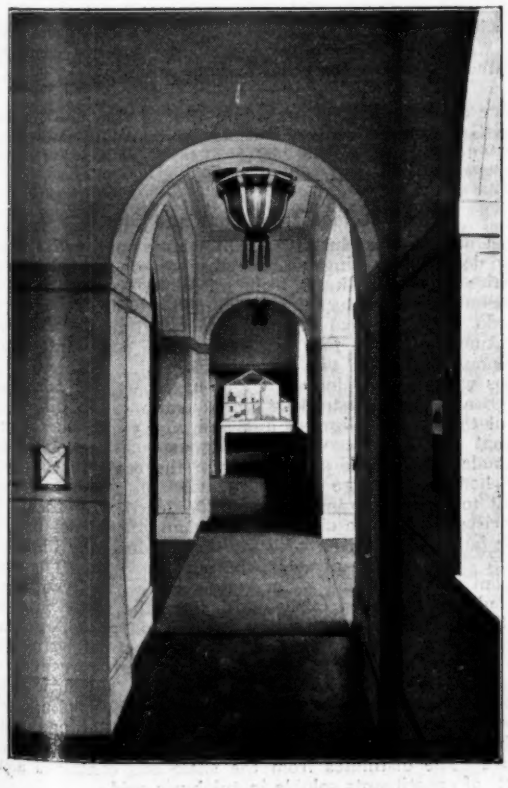
VIEWS IN THE TWO KITCHENS.

place of the orthodox 9 in. by 9 in. brick flue. Substantial savings are made in the absence, not only of projecting chimney-breasts, but also of foundation concrete, brick footings, trimming joists and trimmers, concrete hearths, and skew-back arches, as well as of large brick chimney-stacks. The erection of the legal 9 in. by 9 in. brick chimney is, it is pointed out, quite an unjustified expense in the case at least of bedrooms, where a coal fire is practically never lighted. Yet a room without a flue at all cannot in practice be said to have proper means of ventilation; and the choice of a heating system is limited without regard to the occupant's needs. The Nautilus flue furnishes a satisfactory medium between the two extremes. While saving money on building, it provides the means of adequate ventilation, and leaves the choice of any fuel other than coal or coke. Floor space is saved, and cubic contents are increased, in the absence of projecting chimney-breasts. There are fewer corners and dust-traps. A wider range of design is opened-up to the architect, for the fireplace can be installed at the most convenient point in each room, irrespective of those in the rooms above and below. Nautilus flues can be used in buildings constructed of any material. Indeed, in houses in which the chimney would be the only part built of brick, their particular utility is evident.

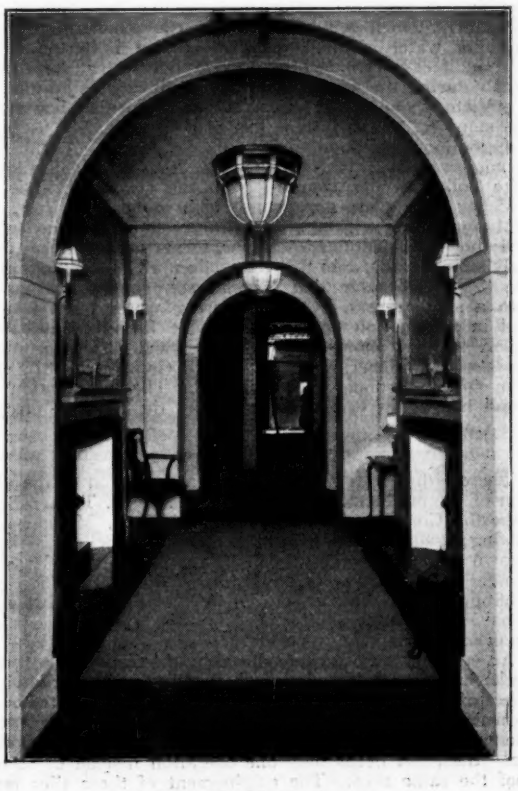
Various other specialities are shown on the stand—including the Nautilus coke boiler, which is made in four patterns and three sizes; a combined cooking and water heating installation; a representative geyser display; Nautilus coal saving grates and hand-beaten metal surrounds; and the patent "Bush" fire, an inexpensive slow-combustion coal grate, possessing the advantage of extreme simplicity of construction and characterized by a high order of artistic merit. The Nautilus surround expands or contracts for fitting into various sizes of chimneypiece opening; and the inner opening is such that it will accommodate practically any size of modern gas grate.

### The "Victor" Gas Boiler.

As on previous occasions, a full display of their specialities in gas boilers is made by Thomas Potterton (Heating Engineers), Ltd., of Ravenswood Road, Balham, S.W. Some of these are in operation, so that architects and builders may freely examine their working. The many adaptations and combinations which can be effected with it justify one in saying that there is a "Victor" boiler equipment suitable for any purpose into which the heating of water enters. An excellent example of an installation for a single-storey building, either a flat or a bungalow, is a No. 921 "Victor" complete set, automatically controlled, having in conjunction with it a towel-rail in circulation at the same floor level as the boiler plant. This arrangement, as has been said, enables hot water radiators or towel-rails to work at the same floor level, in which case a low return is required, yet without affecting high-temperature delivery of water for washing and similar require-



Showing the Smokeless House Model.



A View through the Lounge.

ments. Another set, for intermittent action, demonstrates the quickness of production of hot water for occasional uses, such as sink and lavatory basins, or even baths, when the demand is not continuous. These are only two of a number of arrangements of the "Victor" boiler to which attention is drawn.

A special feature of the display is the "Radiant" system of panel heating by means of a circulating radiator placed on the ceiling, from which radiant heat of the most efficient type is afforded. In connection with central heating there is shown the firm's successful arrangement of gas regulation by air-temperature control. Efficient thermostats, such as this type has proved itself, are of vital importance in connection with gas-consuming apparatus for the purpose named. While speaking of central heating, mention may be made of an arrangement which comprises a "Classic" boiler for low-pressure hot water heating, installed with a Potterton calorifier or "indirect" cylinder, to provide hot water for domestic supply during the winter months, and having as an alternative a "Victor" boiler for direct action to furnish hot water in the summer. This system has proved extremely useful, and is becoming very popular for villa residences. An alternative arrangement to this is to instal a No. o "Domestikatum" coke boiler having connection to the storage cylinder of a "Victor" complete apparatus which is worked direct.

Many visitors will be closely interested in housing schemes, and they will doubtless note the forms of apparatus particularly suitable for use in this connection. There is, for instance, the "Victor-Combination" boiler set, so designed as to fit into a small recess. For delivering water freed from lime and in a condition eminently suitable for all household purposes, there is shown the "Zepho" water softener made by the Becco Engineering and Chemical Company, Ltd., of Fitzalan House, Arundel Street, Strand. The illumination of the stand has again been undertaken by the South Metropolitan Gas Company.

### Asbestos Products.

There is to be seen a practical demonstration of the application of the products manufactured by Messrs. Turner Brothers Asbestos Company, Ltd., of Trafford Park, Manchester, for roofing, walling, and interior decorations—including the well-known "Turners' Trafford" Tiles, "Permanite" asbestos-cement slates and sheets, "Endurol" tiles, &c. The range of roofing materials manufactured by this firm is most comprehensive—catering, as it does, for the special needs of all branches of the building trade.

An entirely new idea introduced by the firm is the "Serval" multiple tile—a boldly designed, readily fixed unit, having the effect of pantiles of substantial thickness. These tiles are designed specially for the roofing of domestic dwellings. One of them has the cover area and appearance of sixteen ordinary sized tiles, but needs only one operation instead of sixteen to roof the same area. The employment of these tiles tends to still further economy. Not only is time saved in laying, but also the roof structure can be considerably lighter.

For interior decoration there are "Permanite" asbestos tiled sheets, which bring tiled walls within reach of almost everyone. "Permanite" tiled sheets are easily erected, and will last for years. They are supplied in sheets 48 in. by 48 in., and can be obtained in ivory, green, heather, light blue, lavender, grey, &c., in both plain-tiled and dado-tiled effects. Their highly glazed surfaces will not crack, fade, or discolour, and will withstand successfully the temperatures and conditions of any domestic dwelling.

Another interesting Turner product is "Serval" asbestos felt, for use where roofing or flooring felts are employed. Unlike the ordinary types of felting, "Serval" asbestos felt is made with a base of mineral asbestos, filled with mineral bitumen. "Serval" felt is impervious to the severest conditions of weather, and lasts for years without attention.

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Notice of other exhibits, including that of the South Metropolitan Gas Company, must be held over until the next issue of the "Journal."

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## Oils Obtained from Coal and Shale.

The United States Bureau of Mines have published a report giving details regarding an investigation on the yields and properties of oils produced from oil shale, lignite, and sub-bituminous coal, conducted in conjunction with the State of Colorado. Of the coal samples obtained from Colorado and other American fields, fourteen were lignite coal, sixteen sub-bituminous coal, and two bituminous coal. The oil shale samples were from Colorado, Utah, Kentucky, Nevada, Scotland, Brazil, and Australia. The average crude oil or tar yield of the fourteen lignites analyzed was 5 gallons per ton; and that of the sixteen sub-bituminous coals, 12·9 gallons. The crude oils or tars produced from the coals in the assay retort had an average specific gravity of 1·009, and were difficult to separate from the water produced with them. In comparison with shale oils and petroleum, these coal tars are heavy; but in comparison with the tars produced by high-temperature carbonization of coals, the tars are light. The crude oils from the shales had an average specific gravity of 0·907, and could be separated fairly easily from the water produced with them. The coal tars when distilled to 275° C. produced about 45 p.ct. of light oils, part of which could be used as motor fuel. These light oils contained a high percentage of compounds (average 65 p.ct.) absorbed by sulphuric acid. About 60 p.ct. of these compounds absorbed by sulphuric acid (40 p.ct. of the light oils) were tar acids. This high percentage was due probably to the conditions under which the coals were retorted. The distillates from the shale oils contained about 40 p.ct. of constituents soluble in sulphuric acid.

# NOTES ON HORIZONTAL SETTINGS: WITH SPECIAL REFERENCE TO SILICA RETORTS.

By Stephen Hay, of the Beckton Works of the Gas Light and Coke Company.

**DISCUSSION BY THE SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS, March 28.**

**[The paper, together with an appendix by Mr. A. Edwards, will be found in the issues of the "JOURNAL" for Nov. 23, 1927 (p. 538), Nov. 30 (p. 612), and Dec. 21 (p. 808).]**

The President (Mr. C. Valon Bennett, of Rochester) said it would be remembered that this paper—which was read at the November meeting—was of extreme value, and that owing to the fact that on the occasion of its presentation there was little time available for discussion it was decided to postpone full consideration of it until the present meeting. He was glad to say that Sir Arthur Duckham had kindly consented to open the discussion.

## Discussion.

Sir Arthur Duckham, K.C.B., said he welcomed the opportunity of opening the discussion; for he agreed with the President as to the great importance of the subject before them. Their warmest thanks were due to Mr. Hay for the splendid work he had done in getting all the material together and presenting it to them, and to Mr. Edwards for his excellent contribution, as well as to the Gas Light and Coke Company, who had done so much to enable the subject to be brought before the Association. He would like, with the permission of the meeting, to deal with the matter at some length. It was one in which he had a very special interest, because he had a great deal to do with refractory materials, and when any failure occurred he personally lost a considerable amount of money. He was interested, not in one works, but in many, and consequently learned of happenings in all directions; though, of course, Mr. Hay was dealing with horizontal retorts, whereas his own experience had been mostly in connection with verticals. Undoubtedly, to-day, the question of refractory material in connection with retorts had a greater effect upon carbonizing costs than any other factor. If they were all quite sure of their material and the method of construction, so that they could work at the most suitable temperature to give the best results without undue expenditure on maintenance and repairs, they would be in a happy position. As they were aware, the cost of maintenance varied widely. He knew of one plant which had been working just over seven years, and had carbonized well over 2 million tons of coal, with an outlay over that period for maintenance of only a few hundred pounds; while, on the other side, there were plants that had got into a bad way in six or eight months.

### What Mr. Hay had Shown.

Mr. Hay had shown them that a higher temperature gave higher yields, and that silica brick was the only material readily available to work such high temperatures. He had also shown that there was an increased conductivity with silica, as compared with clay, which gave these better results; and, further, that silica bricks gave a margin of safety in working. In the beginning, silica bricks presented a difficulty in the matter of considerable expansion; but this trouble had now been overcome, and to-day it was possible to obtain in this country silica bricks which were at least as good as, if not better than, those obtainable in Germany, France, America, or anywhere else. Again, the author had shown that silica brick was capable of withstanding high temperatures externally applied practically without any damage occurring.

### Troubles Originate Inside the Retort.

The author had pointed out, however, that there were certain difficulties with silica bricks, and that these troubles had their origin inside the retort. The difficulties arose from the components of the ash from the material inside the retort. Now, the first point that had to be borne in mind was that this ash was exactly the same ash as was met with in the flues outside the retort; but in the latter case little damage occurred, though the temperature was higher outside than inside the retort. Evidently, then, this action was one that took place in a reducing atmosphere; for outside the retort there was an oxidizing atmosphere, whereas inside the retort the atmosphere was strongly reducing. It was a function of temperature, as was shown by comparison between the results in higher and lower heated portions of the setting. He did not agree that the attack in the joints from the inside was the only action that took place. While there was no doubt that this action from the inside of the retort was greater on the jointing material than on the retort itself, he thought, if those present would examine samples which he (Sir Arthur) produced, they would see that the action was also on the outside of the retort. Other samples would demonstrate that the absorption was no greater at the joint than it was on the face of the retort itself. But this was not of great importance. It was the damage in the joint that mattered, because this caused leakage. It was therefore necessary for them to do two things: They must get their joints tight, and they must employ a jointing material that would withstand this action. It was difficult to keep a joint in a retort absolutely tight. There was movement in scurfing; and there was a certain breathing of the retort. It was gas passing through a leak, and carrying with it ash, that was responsible for the eating-away of the joint.

### Jointing Cement an Important Point.

He had tried all sorts of jointing cement; and he wondered whether the trouble to which they were referring was not a question of the fineness of the cement. If one had a very finely-ground jointing cement—even though it might contain but little impurity—the chemical action on the particles by the components of the ash would be considerably greater than on a coarser jointing cement. The proposal to make a jointing cement mixed with an organic adhesive was important. Mr. Hay and the Gas Light and Coke Company were still working on this matter; and it seemed to him that all those who were engaged on this problem should pool their knowledge to the greatest possible extent. He found everybody most willing to help; and he and his firm, on their part, would be only too pleased to give all the assistance they could. It did appear to him that it would be advantageous to all concerned if the actual manufacturers of these materials took a greater interest in this most important subject.

### A Suggestion for Laying Bricks.

He would like to ask Mr. Hay how, in laying bricks, he overcame the trouble of the great absorptive power of the surface of the silica. Immediately one put the cement on the brick there was such a rapid absorption of moisture that the cement almost dried up at once, and it was very difficult to obtain well-formed joints. He understood it was suggested that bricks should be wetted just before being laid; but, of course, there would be drawbacks to having pails of water in a retort setting under construction. There would be the possibility of an upset, of too much water being put on, and so on. Had the author ever considered painting the surface of a silica brick that was about to be laid with some glue substance that would prevent this absorption?

### To Assist Work on Refractories.

It seemed to him most important that closer work should be done on these refractory materials. He had already put forward a suggestion; and he wondered now whether Mr. Hardie might find himself in a position to carry the matter further. His suggestion was that they should form somewhere a museum or a collection of refractory materials which had suffered in various ways under different conditions. If this collection could be taken in charge by somebody who possessed knowledge, and who took a real interest in the subject, it would be exceedingly useful to those who were contemplating the erection of plants, or who were experiencing troubles of their own. There was a Refractories Committee of the Institution of Gas Engineers who had done splendid work and improved refractories enormously; but something of a more tangible nature was required, because samples, lucidly explained, revealed so much more than anything else. If they could get in London—because everyone came to London—some sort of museum like this, under the direction of a keen and energetic young man, who knew something about the job, it would be a great help. Success or failure was not a matter of workmanship. He believed that to-day workmanship throughout the industry was fine; but at present none of them knew exactly how to meet some of these problems that presented themselves, and if a more effective arrangement could be come to for pooling the knowledge they possessed—and which he was certain everybody was willing to pool—there would be a very great advance made. Mr. Hay had introduced to them a subject of the greatest importance; and the information he had given must prove of value to each one of them.

### Local Erosion.

Mr. R. Robertson (Bristol) said there were one or two points which suggested to him lines of inquiry. His own experience in regard to the matters dealt with in the paper had been chiefly confined to vertical working; and it had been an altogether happy one. He had had no serious cause of failure in respect to silica material; and his only trouble had been in connection with local erosion. On this point, he knew that Mr. Hay or Mr. Edwards had referred to the probable action of the chlorides and the temperature. He had had occasion recently to investigate a case which seemed to be hardly ascribable to these two factors; and if he mentioned briefly what the circumstances were, perhaps Mr. Hay might be able to offer some suggestion as to what was the likely cause. In the case of the vertical retort in question, the erosion took place in a belt about 5 ft. down the retort. The combustion flues occurred along both sides; and there were no flues at the end. The extraordinary thing was that the erosion took place only along the sides opposite the combustion flues. Where there was no combustion flue, there was no erosion; and it seemed to call for some other explanation. The only other factor seemed to be the temperature gradient. In the case of the combustion flue, the temperature gradient was very considerable from outside to inside, as compared with what was the case where no flue occurred.

### Silica for Intermittent Working.

In connection with the subject of silica for retort work in general, one question which naturally occurred to many of them was as to the extent to which this material was capable of giving a good record of itself when used in settings which were liable to be employed only for a short time during the winter. All the records which had been obtained seemed to relate to settings which he presumed had had continuous working; and they were generally given in the form of a quite creditable number of years' service. But he would like to know whether Mr. Hay could tell them of any experience with settings which were only in use for short stretches of time, and were therefore liable to be lighted up and let down frequently over a given period. Meeting fluctuations in load by varying the tem-

perature of working the retorts was not suitable in all cases; and therefore a reply on this point might be useful to many of them.

### Substantial Advantages of Silica.

Mr. G. M. Gill said the paper had greatly appealed to him; and he had gone through it very carefully, to see whether there was anything in it to criticize. He found himself, however, in agreement with everything that it contained. Silica would soon be used extensively almost everywhere. In fact, only the more or less timid man would employ anything else, because there were substantial reasons for using it in preference to fireclay or even siliceous material. He was glad to see the reference in the paper to the Sauvageot grate, which he had seen in use in Germany, France, and the United States. It was a type of apparatus which one could fit to the producer to perform the cleaning work. He had had to go to Paris to examine and report upon one of these grates for an American client, and his report was quite favourable. It seemed to him to be a very good thing; and he thought it really deserved wider adoption over here. He had been greatly interested in what Mr. Hay had said regarding his Company's method of re-lining producers in settings at work. In many cases this would obviate having to drop settings simply for the purpose of repairing furnace linings; so that it should well repay anyone to study this method and adopt it. It was the dropping of the settings and picking them up again that did most of the damage. In coke oven plants, where it was usual to continue at work for long periods, the amount of wear and tear on the refractory materials was nothing compared with what it was in gas-works retort settings; and this, he felt sure, was chiefly due to the fact that the coke ovens were used continuously. Mr. Hay had made reference to the advantage of getting a longer flame in the combustion chamber by admitting secondary air at the top of the setting. Was he aware that in the United States the method was successfully used of diluting the producer gas with waste gases, so as to get this longer flame? It was pleasing to note the author's statement—and he himself could fully endorse this expression of opinion—that the after-expansion of silica was getting much less than formerly, and it was not now necessary to make the allowances that were at one time required. This greatly reduced the anxiety and difficulty of using silica material.

### Retort Section.

As to the section of retort which it was preferable to use, Mr. Hay had explained that those of 24 in. by 18 in. section had not shown up so well as sections which had a height of 16 in. This entirely conformed with his own experience. He believed that a retort which was not more than 16 in. in height was much superior to one 18 in. high. He remembered years ago being instrumental in putting in a section 22 in. by 18 in., oval, at the Wapping Works; and he had been greatly disappointed. Having made a mistake in the section, he could not get the output from these retorts that he had expected. A height of 18 in. certainly limited the output of gas from the retort. In America it was almost standard practice to use a 26 in. by 16 in. horizontal retort; and the output from these retorts, he had often noticed, was very high. At St. Louis, which he had visited on three occasions, they were using this section, and were carbonizing in ordinary working 1500 lbs. of coal in eight hours, in a 20 ft. retort, and it was completely carbonized. This was a fairly good result—working out at something like 2 tons per retort per twenty-four hours—and it was, he believed, largely due to the section of horizontal retort employed. Reference had been made to machine-moulded silica material. He had had the pleasure some time ago of seeing in Germany silica material being beautifully moulded in ordinary brick-making machines. They were making all their sections in these machines, and also all the special shapes which they used in large numbers. One could not make just a few with the machine. The material was certainly of very high quality; and it seemed to him to point the way to cheap manufacture—especially if they could standardize the sizes and shapes of their materials in the way that Mr. Hay had suggested. This was really worth serious consideration. It might be possible for other undertakings to adopt the sizes and shapes that the Gas Light and Coke Company used. This would be one way of starting standardization. A paper like this was most valuable, for it dealt with a subject that they had all got to tackle, because everything pointed to the exclusive use of silica in the comparatively near future.

### A Special Plastic Ganister.

Mr. C. H. Rutter (Brighton) remarked that Mr. Hay had covered his subject so completely that very little criticism could be offered, and only one or two questions arose regarding some of his practices. He (the speaker) quite agreed with what Sir Arthur had said as to the manufacturers being very clever in making the silica material; but the jointing material had always been a difficulty, and it was here that so many retort failures occurred. He had recently been using a special plastic ganister for hot-patching silica retorts, using a fireclay patch. This ganister was made by one of the well-known silica firms, and on the whole they had had very good results from it. It was composed of nearly 76 p.ct. silica, 13 p.ct. calcium sulphate, just a trace of iron (2 p.ct.), and nearly 4 p.ct. of aluminum oxide. It was not suggested that this was an ideal material for hot-patching; but they had not found anything better up to the present. The author spoke about the patching of silica with material dipped in pitch. This had been tried at Brighton; and they had successfully introduced a piece of silica into a hot retort without spalling, after soaking in pitch; but the difficulty seemed to be that after the pitch had burnt away, the finely ground silica, at the temperature of an average retort, remained as a powder, and did not adhere to the silica patch or the retort. Had the author noticed this, and found a remedy for it? Turning to Mr. Hay's remarks on fireclay retorts, he spoke of the failure of a 24 in. by 18 in. Beckton retort after a run of only 536 days. What Mr. Gill had said on this subject made him (Mr. Rütter) wonder whether the larger 18 in. deep retort was overloaded, thus leading to premature failure. With 16 in. retorts these failures had not been so noticeable. At Portslade they had had some fireclay retorts, 24 in. by 16 in., in use for 2525 days, which he thought was a very good record. These retorts had carbonized over 3790 tons, which was a figure that approached what Mr. Hay had mentioned as the life of a silica retort.

### Terms in which to Express Life of Retorts.

Mr. S. E. Whitehead (Portsmouth) said he would like to raise one or two points which were not directed to the use of silica, but to carbonizing results. In chart A, the author had plotted the yield in therms per ton against retort temperatures, and had drawn a straight line from point to point, and said the curve showed no signs of flattening-out. Perhaps he had been a little too optimistic there. In fact, if one referred to chart D, the curve did flatten-out. So one wondered whether it would be possible to get quite the increased value in therms per ton anticipated by the adoption of silica. The author maintained that the life of retorts should be expressed in tons of coal carbonized, rather than in days. This was an excellent practical suggestion; but should it not be modified to the extent of saying the life of retorts of the same size should be expressed in tons of coal carbonized? A larger retort made for a longer life in tons of coal, and for a shorter life in actual days. The remarks relating to the improvement in silica had interested him. They had had an experience at Portsmouth of silica material in some vertical retorts which was actually of better quality than was anticipated, but, owing to its consequent failure to expand to the extent allowed for, open joints and leakage had resulted.

### Some Figures Discussed.

The author said: "Mr. Carmichael, in his recent paper before the Institution of Gas Engineers, claims 30 p.ct. increase in throughput with silica, as compared with fireclay." This was quite right, on the figures; but it referred to vertical retorts under full steaming conditions. Presumably owing to higher temperatures, they were getting an increase in water gas production; but for straight coal gas the increase by the adoption of silica varied from 5 p.ct. to 15 or 16 p.ct. he thought this was more comparable with horizontal retort practice than the steaming figure. At Portsmouth they were very interested in carbonizing costs; and he would be glad to know what was included in the cost per therm as shown in Table C. If it included all retort house labour, as well as coal handling labour, it was very low, and Mr. Hay was to be congratulated upon it. A rough idea of the relative cost of re-setting (say) a bench of ten's in silica, as compared with fireclay, would be very valuable, if the author felt inclined to give it.

### Sir Arthur Duckham's Good Suggestion.

Mr. T. Hardie said he thought Sir Arthur Duckham's suggestion for the founding of a sort of museum for refractories was a very good one; and he would be glad, if it was possible, to co-operate in the carrying of it into effect. There was no doubt it was experience in connection with this subject that was wanted; and their thanks were certainly due both to Mr. Hay and to Mr. Edwards for their joint work. ["Hear, hear."] Careful watching under working conditions, coupled with laboratory investigations, was most likely to provide a solution of the difficulties which faced them. Both Mr. Hay and Mr. Edwards had devoted a tremendous amount of thought to this subject. They had spared no pains in trying to sift the matter down to a real solution. These difficulties varied very much from place to place. Mr. Hay had limited his paper to experiences obtained at Beckton with horizontal retorts. With the large extension of vertical retorts different circumstances were arising, and the difficulties were not quite the same. They might be due to the same causes, but they revealed themselves in a different manner. He himself had no doubt whatever that it was of vital interest alike to Sir Arthur Duckham and to every gas engineer, that they should get to the bottom of these difficulties; for he (the speaker) was one of those who thought that silica had come to stay, and would be the main refractory to be used in gas making practice. Sir Arthur Duckham's assistance was invaluable, because his experience must cover a very much wider area than that of anyone confined to a single gas undertaking. He hoped the paper they had had would lead others on to work in the same direction, so that they might reach the goal at which they were aiming—that was, to make their retorts last very much longer than they did to-day.

### Expansion and Fluxing.

Dr. R. Lessing said he thought none of them could doubt any longer that silica had come to stay, and that it was a most excellent refractory material which possessed very great advantages over the old fireclay. The difficulties about silica, as they appeared to him, were twofold. The first was that of expansion. Now, the question of expansion, so long as it did not interfere with the internal cohesion of the silica particles themselves, ought not to be a very great hindrance to the further application of the material, because it was an effect that could be guarded against by mechanical means, although everybody would agree that in some cases the designer was put to a considerable amount of trouble. The second difficulty was that of fluxing, and failure brought about by that.

In order to gain an insight into what might happen, they had to remember that, after all, the manufacture of a silica block was based on a mild fluxing action. Silica itself, heated to even a very high temperature, so long as it was short of the melting temperature of pure silica, did not cohere like fireclay. Consequently, it was necessary to provide the silica with a binder, which was usually lime, and calcium silicate was formed. In other words, they utilized lime as a flux. At the temperatures at which the blocks were fired, and those to which they were afterwards exposed in practice, calcium silicate stood up very well; the lime being in small proportion. If other fluxes were applied, the matter was a little difficult—particularly if they possessed a greater specific fluxing action. Iron, in the reducing atmosphere to which the material was exposed in a gas retort, formed a lower form of oxide, which had an even greater fluxing action than completely oxidized iron. It was very interest-

ing to see, in the specimens before them, how the iron acted when it was applied in small specks to the silica. Not only did it act locally, but the iron silicate, once it was formed, had a further solvent action. This was really at the bottom of the whole question. One might have a very small quantity of fluxing agent; but it was not only this small quantity which had to be considered. It acted on the larger quantity of slag formed, and caused it increasingly to penetrate the material, so long as it was not prevented by its comparatively high viscosity.

### Importance of Cleaning Coal.

This led them to the great question of trying to prevent these fluxes from coming into contact with the retort material; and this was bound up with a very much larger question which agitated everybody to-day—the cleanliness of the coal. The iron was the chief offender; and if only they could remove all the iron from the coal, they would have accomplished a very great deal. This brought him once again to his old plea for the cleaning of coal. Even small quantities of iron or iron compounds could bring about the trouble which they were discussing. It was no use only to remove a certain amount. They must clear out from the coal, "lock, stock, and barrel," those materials which caused a slagging action on silica, and leave in it only the truly inherent ash. Precisely the same thing applied to the action of the coke on the grate. In fact, he thought that no one who was interested in refractory materials could employ his time better than in studying the clinkering of grates and producers in which coal or coke was consumed, because identically the same actions as in the retort took place there. They had to ascribe to the iron and the alkalis and alkali compounds the difficulties which arose in clinkering. They did not, except in extreme cases, get a uniform mixture which would run like treacle, but local action of the fluxes upon comparatively refractory lumps of ash; and although these would not of themselves offer great difficulty in the management of the fire or producer, once their surfaces were acted upon by the fluxes, the slag acted snowball fashion, and led to further and further trouble. Therefore the question of the standing-up of the silica—apart from the expansion, which he did not consider very serious—was bound up with the cleaning of coal. The specimens exhibited by Sir Arthur Duckham proved that the damage to silica material was not confined to the inside of the retorts. The dust carried by the producer gas through the combustion chambers and outside the retorts was possibly an even greater offender than the ash in the retort charge. As a clean coal would also lead to the use of clean coke in the producers, this side of the problem was equally bound up with the question of coal purification.

### Producer Design.

Mr. W. Hawkyard said it had been remarked by Sir Arthur Duckham that sufficient attention was not given to the design of the producer and the combustion arch or the combustion chamber in horizontal settings. Producers should be so designed as to give a minimum rate of travel of producer gas, so as to obviate the carrying-over of flue dust, which gave rise to this fluxing on the retorts themselves. Sir Arthur had shown by his samples and tests the evil effects of this carrying-over of the flue dust.

The President (Mr. C. Valon Bennett) said they were all deeply grateful to Mr. Hay and Mr. Edwards, and also to the speakers in the discussion, who had given them the benefit of many valuable experiences.

### Mr. Hay's Reply.

Mr. Hay remarked that, before replying to points that had been raised in the discussion, he would like to say how much both Mr. Edwards and he appreciated the manner in which the paper had been received. Sir Arthur Duckham had referred to temperature. This was very important. At temperatures below 1350° C. they did not expect to have trouble with fireclay or jointing cement. Reference had been made to an installation seven years old, which had carbonized something over 2 million tons of coal. Certainly the fact of whether a coal was a swelling type or otherwise would have quite a material effect on the life of an installation. It was known that iron did move about in the silica material. One point that had struck him in connection with vertical retorts was that the material could now—since the makers were in a position to turn out finer shapes—be made up so that the joint would be very much smaller than at present. They wanted the cement ground to a fine degree, although there was a limit to fineness. A suitable screening might be 70 p.ct. through 80 mesh I.M.M., and not more than 20 p.ct. to remain on 50 I.M.M. When laying the bricks, they did wet the surface; and they found it to be an advantage. They had no experience of painting with glue.

A point had been put by Mr. Robertson in connection with erosion taking place about 5 ft. down a retort. He (the speaker) could offer no explanation of this, unless it was due to rodding. As to lighting up and letting down silica retorts, he could only say that at Beckton—where they practically governed the whole of the Company's stock of gas—they were continually putting retort houses in and out of action; and if it was done with proper care, no harm resulted to the silica. He did not know that he could agree with Mr. Rutter with regard to plastic ganister and fireclay patching. He did not think the percentage of silica was nearly high enough for what was expected of it. Mr. Rutter referred to the heating of silica patches through the critical temperature, and "buttering" the patch with jointing cement. He himself had experienced very much the same sort of trouble; the cement did dry and flake off. Replying to Mr. Whitehead, he could confidently say that they had obtained at Beckton over 20 p.ct. increase in throughput due to silica alone. With regard to the cost per therm figures, these included coal into the retort house and coke out of the house. He had no figures relating to the cost of silica; but certain makers he had asked for information had told him that the cost of silica was the same as of siliceous material erected anywhere on the south coast of England. He would like to thank Mr. Hardie for the opportunity of presenting this paper.

### Remarks by Mr. Edwards.

Mr. Edwards remarked that there seemed to be running through the minds of many people that there was still an attack of dust from furnace gases; but so far as Beckton experience went, they had found no trouble. The setting Mr. Hay had referred to as having been let down for examination of the joints was in absolutely perfect condition. There was no sign even of staining from leakage. He could only think that in connection with the specimens which Sir Arthur Duckham had displayed there must have been some conditions present other than those which they had at Beckton. There was nothing very special about the design or areas of the producers at Beckton. He did not know sufficient about samples which had been produced to say whether the attack might have arisen from material flowing down outside the retorts. This could happen; and he believed Sir Arthur had a specimen in which the corrosion had taken place on the outside. Their experience at Beckton had been entirely with horizontal retorts. Verticals were quite a new line with them; but they had had referred to them several specimens of retort material that had failed at other works, and had very carefully examined them.

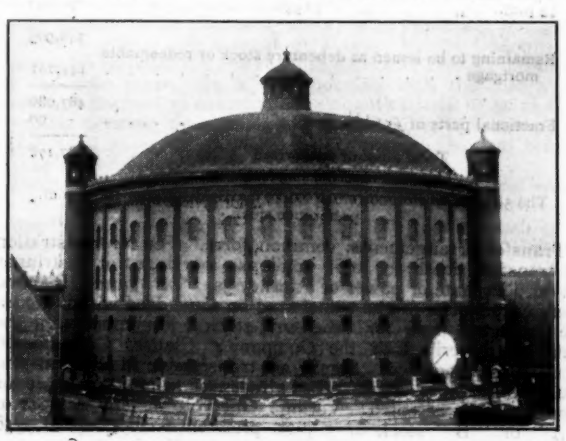
### Joints.

In the case of the retorts which they had built-up with three-piece bottoms, it was the combustion chamber side joint which had given the most trouble; and also the centre joint, which was vertical, so that the coal ash could get right into it. With the horizontal joint there was not, of course, this difficulty. There was still the possibility of leakage; but the joint was subject to the pressure of sections above, which helped it to remain tight. In the case of vertical retorts, there were horizontal joints subject to all the pressure of the brickwork above; and therefore if there was any contraction at all this was immediately taken up by the weight above. When, however, they came to the vertical joint there was no such action, and one could imagine how much greater was the possibility of joint leakage. He believed it was recognized that there was a greater leakage from vertical retorts than from horizontals. The two cases differed in the way that ash could act on the joints. The vertical joint in the vertical retort could not acquire the same amount of ash as the particular joint to which he had referred in the base of the Beckton horizontal retorts. They, at any rate, thought that the proper thing was to put into the joint a material which would not shrink—that was the whole point. To this end it must be very refractory—*i.e.*, of the material from which their blocks or bricks were made. If they put in a pure silica quartz cement, without any clay whatever, but only the alumina which it had naturally, and which was generally below 2 p.ct., they could not have this contraction. He thought that in the case of vertical retorts the application of this silica cement would be even more beneficial than in that of horizontals. Personally, he had found the manufacturers intensely keen to take up the matter of cement, and to be led into the way in which they would like them to go. It seemed to him that the design of blocks could be improved, in the direction of getting a much finer fit between tongue and groove.

A question had been asked by Mr. Robertson as to erosion; but he had rather himself supplied an explanation—the action of iron chlorides. All he could refer him to was the fact that hydrochloric acid was formed at very low temperatures; and 5 ft. down in a vertical retort—especially on the side which was not heated—the temperature would be low, and there be might have a concentration of HCl. Mr. Rutter's 13 p.ct. of lime seemed excessive; 2 p.ct. was ample. A sample before him showed that iron could wander from the blocks into the cement: in what form it had wandered, he was not prepared to say. Dr. Lessing had spoken of the deashing of coal. It would be all to the good if this could be carried out satisfactorily; but there was still quite a lot to learn about the subject of ash in coal. He (Mr. Edwards) ventured to suggest that inherent ash, with iron and other things, might be just as troublesome when the other particles had been removed.

## FROM GAS STORAGE TO PRISON.

A news agency sends us this photograph, accompanied by the statement that it is a picture of a disused gasholder in Berlin which has been converted into a prison, owing to the lack of accommodation for German criminals. It looks to us much



like one of the old buildings in which on the Continent, in times long since, some gasholders were housed. A new roof has been built, and windows have been cut in the sides. The conversion to a prison took two years.

# POTENTIAL INVESTMENTS.

## X.—THE TOTTENHAM DISTRICT LIGHT HEAT AND POWER COMPANY.

The Tottenham and District Light Heat and Power Company was established in the year 1847. It was incorporated as the Tottenham and Edmonton Gas Light and Coke Company by Special Act of Parliament in 1859, and further powers were obtained between the years 1876 and 1925, the name being changed in 1913, when the undertaking of the Enfield Gas Company was acquired and the power held by the Urban District Council of Wood Green to supply electricity under an Order of 1902 was transferred to the Company. The electrical undertaking can be purchased by the Council under section 2 of the Electric Lighting Act, 1888, and it is also purchasable on one year's notice at a price equal to the capital expenditure *plus* 20 p.ct. if the notice expires during 1928, 19 p.ct. if the notice expires during 1929, and so on (the additional proportions being reducible by 1 p.ct. in respect of each year after 1929).

The Company is promoting a Bill in the present Session of Parliament, the main object of which is to acquire the undertaking of the Waltham and Cheshunt Gas Company. The Bill, among other matters, seeks to acquire the ordinary stocks of the Waltham Company on the basis of £156 17s. 3d. for every £100 of 10 p.ct. Waltham stock and £109 16s. 1d. for every £100 of 7 p.ct. Waltham stock. The loan capital of the Waltham Company would be a par exchange. Another proposal of the Bill is to convert each £100 Tottenham "A" stock into £100 "B" stock, together with £30 5 p.ct. preference stock. After the passing of the Bill, the "B" stock will be known as "ordinary stock." The Company is also seeking power to borrow up to one-half the ordinary and preference capital, in addition to asking for new capital powers, so that the extra amount of capital under the Bill would be £590,128, of which sum £290,128 may be said to be due to the difference in calculating the amount of loan capital that may be raised subject to the qualification that the conversion of the "A" stock and the conversion of the Waltham stock affects the calculation.

The area of gas supply extends to about 30 square miles of North London suburbs, including districts of Tottenham, Edmonton, Wood Green, Enfield, Bush Hill Park, Ponders End, Enfield Highway, Enfield Wash, and parts of Harringay, Palmers Green, Winchmore Hill, Muswell Hill and Southgate. The population of the area is about 460,000, and the services number: Gas 96,889, and electricity 3049.

The capital of the Company as shown by the last accounts is as follows:

*Capital Stock.*

| | £ | £ |
|---|---|---|
| "A" consolidated stock (5 p.ct. standard) | | 120,000 |
| "B" " " (3½ " " ) | | 882,275 |
| 5 p.ct. preference stock | | 26,235 |
| 5½ " " " | | 150,000 |
| | | 1,178,510 |
| Premium capital "B" stock | 103,543 | |
| " " 5½ p.ct. preference stock | 3,514 | |
| | | 107,057 |
| Remaining to be issued as consolidated stock or preference stock | | 174,918 |
| | | 1,460,485 |
| Fractional parts of £5 redeemed | | 1,044 |
| Total amount authorized | | £1,461,529 |

*Loan Capital.*

| | £ |
|---|---|
| 4 p.ct. debenture stock | 181,255 |
| 6 p.ct. redeemable mortgages, 1928 | 70,000 |
| 7½ p.ct. " " , 1936 | 91,650 |
| | 342,905 |
| Remaining to be issued as debenture stock or redeemable mortgage | 144,181 |
| | 487,086 |
| Fractional parts of £5 redeemed | 90 |
| Total amount authorized | £487,176 |

(Amount received in premiums, £8635.)

The 5½ p.ct. preference stock ranks for dividend after the 5 p.ct. preference stock.

Transfer arrangements, common form. Fee for registration of transfer, death in joint holdings, marriage, or distringas 2s. 6d. Probate or power of attorney 5s. "A" and "B" and preference stocks can be transferred on same deed without extra fee; separate deed for debenture stock. For mortgages the form as prescribed by the Companies' Clauses Consolidated Act, 1845, is required. Stocks are transferable in amounts and multiples of £5. Husband's witness of wife's signature or *vice versa* not accepted. Voting: One vote for any amount of "A" or "B" stock or 5 p.ct. preference stock up to £50 inclusive, and one for every £50 beyond. Maximum, 20 votes. The 5½ p.ct. preference stock does not confer voting rights. Director's qualification £500 capital stock of any class.

Accounts and dividends: Accounts made up to Dec. 31 and submitted in February, dividends (ordinary and preference) being paid in August and after the annual general meeting. The standard price of gas is 1s. 1½d. per therm. Present selling price, 9d. per therm. Declared calorific value 500 B.Th.U. per c.ft. Dividends on the ordinary stock are subject to sliding-scale—viz., ⅛ d. per therm above or below the standard price = ¼ p.ct. per annum in dividend.

The following table illustrates the progress made by the Company since the year 1903. The period of the war and the few following years have been purposely ignored in consequence of the abnormal conditions then prevailing.

| Year. | Average Gross Selling Price of Gas per 1000 C.Ft. | Quantity Sold. Thousands C.Ft. | Capital Expended per 1000 C.Ft. Sold. | Gross Profit (Including Electricity Section). | Total Charge for Capital. (a.) | Rates of Ordinary Dividend. P.Ct. per Annum. | Amount Carried Forward and Balance Reserve Fund. |
|---|---|---|---|---|---|---|---|
| | s. d. | | s. d. | £ | £ | £ s. d. | £ |
| 1903 | 3 0 | 844,295 | 10 2 | 34,773 | 25,985 | A 6 0 0<br>B 4 10 0 | 27,281 |
| 1908 | 2 6 | 1,383,698 | 8 11 | 38,474 | 37,003 | A 6 15 0<br>B 5 5 0 | 36,159 |
| 1913 | 2 1 | 1,948,478 | 7 9 | 45,064 | 47,307 | A 7 7 6<br>B 5 17 6 | 60,732 |
| | Per Therm. d. | Therms. | Per Therm. s. d. | | | | |
| 1923 | 10·2 | 13,413,201 | 2 0 | 104,583 | 90,123 | A 8 0 0<br>B 6 10 0 | 78,239 |
| 1924 | 9·6 | 14,276,945 | 1 11 | 94,630 | 95,145 | A 8 0 0<br>B 6 10 0 | 78,310 |
| 1925 | 9·85 | 14,857,005 | 2 0 | 100,822 | 94,325 | A 7 7 6<br>B 5 17 6 | 85,180 |
| 1926 | 9·7 | 15,209,745 | 1 11 | 95,473 | 97,455 | A 7 12 6<br>B 6 2 6 | 84,893 |
| 1927 | 9·7 | 15,918,995 | 1 10½ | 105,746 | 99,856 | A 7 13 9<br>B 6 3 9 | 91,539 |

(a) The total charge for capital includes dividend and interest paid and amount (if any) carried to reserve fund, and interest on capital spent on electricity undertaking.

The increase in the gas sold as compared with the year 1903 is 277 p.ct., which is exceptional. It will be seen that since the war there has been a steady progress in gas sales, and that the position of the Company is a strong one. With regard to the electricity section of the Company's district, the progress has been quite satisfactory, and the balance of profit has improved each year; the amount brought into the accounts for the past year (£14,646) being a material factor. The capital expended, a little over 1s. 10½d. per therm, is quite low for a suburban company.

While the stock is closely held, there has been quite an appreciable number of transactions during the past year in the "B" or 3½ p.ct. standard stock. The "A" or 5 p.ct. standard stock is rarely in the market by reason of the small amount of the issue. The following two tables show the prices of the highest and lowest transactions on the stocks, the dividends paid, and the yield on the average price during the five years 1923-27:

*"A" 5 P.Ct. Standard Stock.*

| Year. | Transactions. Highest. | Transactions. Lowest. | Dividend. | Yield P.Ct. per Annum on Average Price. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| 1923 | 125½ | 116 | 8 0 0 | 6 12 6 |
| 1924 | 122½ | 117 | 8 0 0 | 6 13 7 |
| 1925 | 122 | 105 | 7 7 6 | 6 9 11 |
| 1926 | 112½ | 107½ | 7 12 6 | 6 18 7 |
| 1927 | 110 | 107 | 7 13 9 | 7 1 8 |

*"B" 3½ P.Ct. Standard Stock.*

| Year. | Transactions. Highest. | Transactions. Lowest. | Dividend. | Yield P.Ct. per Annum on Average Price. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| 1923 | 106 | 98½ | 6 10 0 | 6 7 3 |
| 1924 | 103½ | 99 | 6 10 0 | 6 8 4 |
| 1925 | 104 | 85 | 5 17 6 | 6 4 4 |
| 1926 | 91 | 86½ | 6 2 6 | 6 18 0 |
| 1927 | 94 | 90 | 6 3 9 | 6 14 6 |

The average quotations of these stocks at the present time are

| | |
|---|---|
| "A" stock | 112–117 |
| "B" stock | 92– 95 |

and the authorized dividends under the sliding-scale for the current half-year are

| | |
|---|---|
| "A" stock | 8 p.ct. |
| "B" stock | 6½ ,, |

so that there is a reasonable prospect of a return to those percentages which, it will be noticed, were paid for the years 1923 and 1924. The yield at the present average price at these rates would be, on the

| | £ s. d. | |
|---|---|---|
| "A" stock | 6 19 8 | p.ct. |
| and the "B" stock | 6 19 0 | ,, |

The 5½ p.ct. preference stock is quoted at 98-101, and the 4 p.ct. debenture stock at 74-77.

# CLEAN COAL IN THE COKING INDUSTRY.

**Extracts from a Lecture by Dr. R. Lessing before the Coke-Oven Managers' Association at Newcastle on March 31.**

The need for clean coal in the manufacture of metallurgical coke has been recognized by the coking industry from its inception, and remains more pressing than in any other branch of coal utilization. The reason for this is twofold: First, an excess of inert matter unduly burdens the work of the blast furnace, and, secondly, the cheapest and, by its subdivision, most convenient grade of coal suitable for coking happens to carry the largest amount of mineral impurity. The degree to which such cleaning is effected is determined by the limitations of existing washing plants.

Individual coke oven works may turn out a product containing no more than 7 p.ct. of ash, and a restricted quantity of still lower ash content is made in isolated cases where particular attention is paid to coal selection or cleaning. The average ash reduction of coking plants, however, may be taken to be such as will supply a coal from which coke containing ash of the order of 10 p.ct. is obtained.

If this ash is merely regarded as a diluting impurity, the carbonizing capacity of the industry with an output of approximately 13 million tons of coke per annum is burdened with a dead weight of 10 p.ct. of its output, or (say) 1,300,000 tons. A corresponding capital outlay in ovens, conveying plant, and coke pushers has to be allowed for, and the operating expenses are increased by handling this quantity, heating it and thus losing surplus gas, and incurring railway charges and incidental expenses.

Calculated on the basis of the number of coke ovens in use, it would appear that in this country the equivalent of about 1200 coke ovens is kept going throughout the year for the benefit of heating refuse to coking temperature.

As it will be shown later that the bulk of this ash is not inert, but definitely injurious, its bearing upon the general balance of the coking process and upon national fuel economy will be realized.

There can be little doubt that, even apart from these quantitative disadvantages, the ash in coke is as detrimental to its utilization as it is in connection with the utilization of coal itself; and it is hardly an exaggeration to say that a disproportionately large amount of inventive and designing activity in the whole field of fuel technology is directed to overcoming difficulties which are conditioned by the presence of incombustible mineral substances. If coal or other solid fuels were free from ash, many of the existing problems would solve themselves, and the difference between solid and liquid or gaseous fuels would practically disappear.

As long as this ideal state of affairs remains a pious wish, and as long as we have to reckon with the presence of non-removable inert substances, it seems appropriate to submit the mineral impurities to a detailed study, and not merely regard them as a necessary evil and treat their total amount arithmetically. The result of such a study will prove that the current practice of cleaning coal either by wet or dry methods does in many cases not avail itself of the fundamental facts which should form its theoretical and practical tests.

In the first instance, stress must be laid on the difference between ash and mineral matter. We are accustomed to speak of coal ash even when questions of constitution are being dealt with, and in coal analysis it is usual to regard the difference between the weight of sample and the residue from its ignition as pure coal substance. This method of procedure entails considerable errors, since the inorganic substances originally present in the coal differ in both form and composition from the compounds remaining in the residue after the coal is burned. By purely arithmetical calculations of the loss of water of hydration in clay and shale, of the carbon dioxide liberated from carbonates, and of the addition of oxygen to pyrites and other iron compounds, with a coal containing about 10 p.ct. of ash, the carbon in the pure "ash-free dry" coal may be found 3 p.ct. higher than it would appear without such a correction. Similarly, the calculation of calorific value and volatile matter would present a distorted picture, quite apart from the influence upon the volatile value of the catalytic effect of individual mineral components.

The author then proceeded to deal with mineral matter, and coal formation, remarking in passing that the key to the work done during recent years in the investigation of mineral matter is the characteristic association of certain inorganic compounds with each of the three or four principal groups of coal components. If banded bituminous coal is subdivided, as proposed by Stopes, into clarain, vitrain, durain, and fusain, the ash in each of the four ingredients is found to be of definite amount and composition. Dr. Lessing dilated on the work in this regard which has been done by various investigators, in view of the fact that a study is particularly necessary for an intelligent appreciation of the distribution of mineral matter in coal in connection with cleaning operations. It has been shown that every component of the coal substance and every accessory occurring in commercial coal yields a more or less defined amount of ash of a particular chemical composition and of definite physical characteristics. It must, not, however, be assumed that the ash in each ingredient of the coal mass is evenly distributed or even of entirely uniform composition, for both the ash content and its composition vary within one group according to the size of particles.

## Coal Sampling.

Lack of homogeneity in the amount and distribution of ash in coal renders sampling operations very difficult. The differences in shape, surface properties, specific gravity, and size of particles of the individual coal components cause segregation whenever coal is heaped up or is loaded into or discharged from trucks, ships, or bunkers. The difficulty of drawing average samples becomes particularly acute when raw coal or inadequately prepared coal is to be sampled, as such coal consists of a mechanical mixture of clean coal, dust, and refuse.

## Coal Cleaning.

The fact that coking slack consists of such mixtures of clean coal, dust, and refuse, forms the basis of all cleaning operations for the preparation of coal for coking purposes. Considering that the general run of coking slacks in this country contains usually amounts of from 60 to 80 p.ct. of clean coal containing from 1 to 3 p.ct. of ash, or little more, it cannot be said that cleaning processes as practised to-day have reached a very high standard of ash reduction; for it is considered good practice to prepare coal yielding an 8 p.ct. ash coke, and a 10 p.ct. ash coke may be taken to represent the average produced in the country. This figure would be equivalent to from 6·7 to 7 p.ct. of ash in the coal carbonized. To this total, only from 1 to 1·5 p.ct. is contributed by the inherent ash of the coking fraction, while the balance of 5 p.ct. or more is derived from the "dirt" of non-coking coal slack. It will therefore be seen that only from 1·5 to (say) 3 p.ct. out of a total of 10 p.ct. in coke is essential and unavoidable ash.

For reasons to be discussed below, it is important not only to know the total ash content of a coke, but to differentiate between the composition and the distribution of the ash throughout the coke mass. As it is impossible with the means at present at disposal to examine coke quantitatively so as to discriminate between the various ash components, it is necessary to fall back upon the rational composition of the coal before coking in order to gain this information.

Table I. has been constructed to show the rational composition of the ash in coke obtainable from two types of slacks cleaned to different degrees of purity. The inherent ash contents of their "clean coal" fraction are 3 and 2 p.ct. respectively, and it is assumed that they have been cleaned, so as to yield the total ash percentages of coke shown in the last column.

The percentage amounts of clean coal, dust, and refuse, and their ash contents, are taken from actual experience, but stated in round figures by way of example.

It will be seen that the ash contributed by the dust and refuse are in all cases far in excess of the ash in the coking portion which constitutes the bulk.

The last line in either case shows the degree of purity which is obtainable if the truly clean coal is separated from its impure accessories.

These results are no longer a dream of the research chemist,

but can be obtained economically in commercial working on the very largest scale.

Table I

| — | Coal. | | | Coke. | | | |
|---|---|---|---|---|---|---|---|
| | Amount. | Ash in Fraction. | Ash Contributed. | Yield of Fraction. | Coke Contributed. | Yield Contributed. | Ash Contributed. |
| | P.Ct. | P.Ct. | P.Ct. | P.Ct. | P.Ct. | P.Ct. | P.Ct. |
| Raw Coal A— | | | | | | | |
| Clean | 70 | 3 | 2·10 | 66 | 46·2 | 67 | 3·0 |
| Dust | 10 | 15 | 1·50 | 69 | 6·9 | 10 | 2·2 |
| Refuse | 20 | 65 | 13·00 | 80 | 16·0 | 23 | 18·8 |
| | 100 | | 16·60 | | 69·1 | 100 | 24·0 |
| Washed Coal A2— | | | | | | | |
| Clean | 84 | 3 | 2·52 | 66 | 55·4 | 83 | 3·8 |
| Dust | 11 | 15 | 1·65 | 69 | 7·6 | 11 | 2·5 |
| Refuse | 5 | 65 | 3·25 | 80 | 4·0 | 6 | 4·9 |
| | 100 | | 7·42 | | 67·0 | 100 | 11·2 |
| Washed Coal A3— | | | | | | | |
| Clean | 86 | 3 | 2·58 | 66 | 56·7 | 85 | 3·9 |
| Dust | 12 | 15 | 1·80 | 69 | 8·3 | 13 | 2·7 |
| Refuse | 2 | 65 | 1·30 | 80 | 1·6 | 2 | 2·0 |
| | 100 | | 5·68 | | 66·6 | 100 | 8·6 |
| Clean Coal A4— | | | | | | | |
| Clean | 100 | 3 | 3·00 | 66 | 66·0 | 100 | 4·5 |
| Raw Coal B— | | | | | | | |
| Clean | 70 | 2 | 1·40 | 66 | 46·2 | 67 | 2·0 |
| Dust | 10 | 15 | 1·50 | 69 | 6·9 | 10 | 2·2 |
| Refuse | 20 | 65 | 13·00 | 80 | 16·0 | 23 | 18·8 |
| | 100 | | 15·90 | | 69·1 | 100 | 23·0 |
| Washed Coal B2— | | | | | | | |
| Clean | 84 | 2 | 1·68 | 66 | 55·4 | 83 | 2·5 |
| Dust | 11 | 15 | 1·65 | 69 | 7·6 | 11 | 2·5 |
| Refuse | 5 | 65 | 3·25 | 80 | 4·0 | 6 | 4·9 |
| | 100 | | 6·58 | | 67·0 | 100 | 9·9 |
| Washed Coal B3— | | | | | | | |
| Clean | 86 | 2 | 1·72 | 66 | 56·7 | 85 | 2·6 |
| Dust | 12 | 15 | 1·80 | 69 | 8·3 | 13 | 2·7 |
| Refuse | 2 | 65 | 1·30 | 80 | 1·6 | 2 | 2·0 |
| | 100 | | 4·82 | | 66·6 | 100 | 7·3 |
| Clean Coal B4— | | | | | | | |
| Clean | 100 | 2 | 2·00 | 66 | 66·0 | 100 | 3·0 |

### Effect of Ash as Inert Matter.

The greater part of the inorganic constituents in coke may be regarded as inert matter. Their function is then one of a diluent. They act similarly to the additions of sand, powdered coke, or electrode carbon, which have, for a long time, been made use of for judging the agglutinating power of coal. Up to a point their action is also analogous to that of coke breeze, the addition of which to coal has been recommended from time to time for carbonizing purposes. The effect is not quite comparable with that of the use of mixtures of coking and non-coking coal. For, when such mixtures are submitted to the coking process, the non-coking coal takes part in the general chemical and thermal reactions, and does not act merely mechanically as a "bubble burster." While the amount of ash in normal cases is not sufficient to keep discrete particles from adhering to each other, it reduces *pro tanto* the strength of the coke, and also causes the production of breeze. Coke breeze has invariably a higher ash percentage than the lumps from the same charge, and in a recent test in which a coal was coked from which all "free dirt" had been removed, the breeze production amounted only to 3 p.ct., as compared with 10 to 12 p.ct. of breeze in coke made from the same coal which had been passed through the ordinary washing process.

The fractions of coal which are particularly prone to form breeze are the "free dirt" and the dust containing fusain and fine clay. The latter is obtained in the coal washing process in the form of slurry; and the practice of re-incorporating this material into the washed coking slack in order to gain bulk must be strongly deprecated.

### Specific Disadvantages of Ash in Coke.

While not so many years ago some blast furnace managers still considered ash as desirable in coke, the drawback of a high ash percentage in coke has, during the last few years, been discussed by a number of workers, who agree that it is undesirable because it reduces the hardness and resistance to abrasion of the coke produced, the fixed carbon in the fuel, and hence the available heat in the hearth, and because it necessitates the use of additional fuel and limestone for melting.

The depreciation in value per ton of coal was assessed by E. H. Lewis to be approximately 9·4d. for each 1 p.ct. of ash above a standard of 5 p.ct., and E. S. Gill stated recently, in a paper before the Iron and Steel Institute, that every 3 p.ct. reduction of ash in coke effects a saving of 1s. 3d. per ton of pig iron made. In Dr. Lessing's opinion, this estimate is on the low side.

The influence of the amount and composition of the ash in coke is of the utmost importance for the limestone requirements of a blast furnace. In the rational analysis of a great number of coal ashes, the author has found that the bulk of silica and the preponderating portion of the alumina in a coal ash are contributed by the "dirt" portion.

This is clearly shown in Table II., in which the distribution of silica and alumina in an unwashed and a washed coal are compared.

Table II.

| — | Unwashed. | Washed. |
|---|---|---|
| | P.Ct. | P.Ct. |
| Ash in coal | 18·01 | 4·92 |
| Dirt " | 20·00 | 5·00 |
| Total $SiO_2$ in ash | 50·25 | 34·14 |
| Dirt " " | 44·14 | 18·50 |
| Total $SiO_2$ in coal | 9·05 | 1·68 |
| Dirt " " | 7·95 | 0·91 |
| Dirt $SiO_2$ : total $SiO_2$ | 87·84 | 54·18 |
| Total $Al_2O_3$ in ash | 24·54 | 24·32 |
| Dirt " " | 19·71 | 9·27 |
| Total $Al_2O_3$ in coal | 4·42 | 1·20 |
| Dirt " " | 3·55 | 0·46 |
| Dirt $Al_2O_3$ : total $Al_2O_3$ | 80·32 | 38·11 |

It proves that by the washing process silica and alumina are reduced at a greater rate than the remainder of the ash. This would, of course, also apply to iron, with the obvious advantage of the incidental removal of inorganic sulphur.

The entire removal of the "dirt" silica not only dispenses with the equivalent amount of limestone in the burden of the blast furnace, but it has a more positive effect. For it so happens that the ash from the clean coal portion consists of low melting compounds which in themselves exert a fluxing action; and when no longer neutralized by the silica, they replace an equivalent amount of limestone.

The value of a coke containing only 3 or 4 p.ct. of such low melting ash may be gauged from the fact that in a blast furnace charge the silica and alumina in coke may be equal to 50 p.ct. or more of the amount of these compounds contained in the corresponding quantity of iron ore.

### Influence of Ash Composition.

One of the difficulties of studying the effect of inorganic constituents primarily upon the coking process, and secondarily upon the work of the blast furnace, is the lack of knowledge of the chemical reactions which these compounds undergo, and, indeed, of the precise form in which the various elements are combined in the coal before coking. Silica may be free or in form of pure clay (as in durain). It may be present in shale of various composition, or in form of iron silicate. The iron occurs in at least five forms. The differences found in the $Al_2O_3 : SiO_2$ ratio of the ashes of fusain, durain, clarain, and vitrain prove that alumina is not entirely present in form of clay substance or similar aluminium silicate. Whether and to what extent the alkali and a portion of the lime are in organic combination are still matters for conjecture. At high temperature all these compounds are subject to the reducing action of the organic coal substance or its products of decomposition. Interaction between individual inorganic constituents is in the first instance dependent on their orientation to each other, for it must not be supposed that the ash constituents are present in a homogeneous mixture. The author mentioned that in the Cantor Lectures, 1925, he gave an imaginary picture of the behaviour of the ash skeleton of coal on the fuel bed of a furnace grate. Similar phenomena would happen in the higher zones of the blast furnace, with the additional complications introduced by the presence of the matrix of iron ore and limestone. Though at the higher temperatures prevailing in the lower regions of the blast furnace the ash, matrix of ore, and limestone are completely fused, the high viscosity of the slag makes it more than probable that it does not consist of an entirely homogeneous mixture.

### Influence of Catalysts upon Coking.

The mineral constituents of coal or their products in coke have been considered so far in their relation to the properties of coke. Their influence on carbonization and combustion—a function which is chemically the most important, scientifically the most interesting, and practically the most promising—is

the capacity of directing catalytically the course of thermal decomposition. Dr. Lessing stated that in 1914 he called attention to the catalytic effect of inorganic compounds on the carbonizing process. This effect was definitely established in subsequent work carried out jointly with M. A. L. Banks, and lately has been confirmed by other workers. In another table the author recorded results which demonstrated the effect exerted by small additions of inorganic compounds to coal before coking. The coal used was the clarain fraction of a Yorkshire coking coal, the ash content of which had been reduced to 0·86 p.ct. The additions made were of the order of 1 p.ct. of the coal, and though so small, the effects produced were remarkable.

According to the compounds added, the coke yield varied from 66 to 54 p.ct., the tar from about 17 to 29 p.ct., and the retort carbon formed from 1·3 to 8·5 p.ct. This latter variation gives an indication of the difference in character of the tar produced with each addition, and it shows the susceptibility of some of the tar to secondary thermal changes. Some of the retort carbon may be regarded as a potential form for tar, if it could only be prevented from cracking; and if it is added to the tar, remarkable figures are produced. These show that with the clean coal without any addition, the potential tar yield was 37·5 gallons. The differences in yield are equalled, if not surpassed, by the differences in properties of the product. The fact foreshadowed by early work that the reactivity of the coke can be influenced by certain catalysts has since been repeatedly proved; and this particular phase of the investigation is likely to provide a fruitful field of future research.

A primary condition for these methodical applications of catalysts to coal is the reduction of its ash content to a minimum, so as to eliminate the risk of counteracting their effect by the uncontrollable presence of undesirable mineral constituents. It will then be possible to direct the coking process at will, and by reason of the quality of the product obtainable will open an entirely new vista for coke utilization. The coking industry will be the first branch of the carbonizing industry which will feel constrained to insist for its raw material on coal containing only a small fraction of the proportion of mineral matter which has been customary until now. The provision of such a commodity is now well in sight, and is likely to prove of economic advantage to both the supplier and the user.

# LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

## A Visit of Varied Interest.

On April 14 the Association inspected the Woodford Showrooms, the Woodford waterless gasholder, and the Stratford Works, of the Gas Light and Coke Company. Each item of this tripartite visit proved of exceptional interest; and though the programme was an extensive one, the excellent arrangements which had been made by the Company, to whose hospitality the Association owe a great deal, enabled it to be carried through with the utmost comfort.

### The Woodford Showrooms.

The visit commenced here. These showrooms and offices were designed and decorated by Mr. Walter Tapper, A.R.A., President of the Royal Institute of British Architects; and the adjoining buildings forming the stores have been enlarged by Mr. Austen Hall, F.R.I.B.A. The showrooms were officially opened in June, 1927, and were described in the issue of the "Journal" for June 29, 1927, p. 985. On the ground-floor are the showrooms proper, divided into five bays for the suitable display of cookers, fires, gas and coke water heaters, lighting fittings, and other apparatus. Suitable arrangements for the reception of customers' accounts are here provided. The first floor is arranged to give accommodation for the inspectors' staff, and on the upper floor are situated a demonstration room for the women's advisory staff to lecture on, and demonstrate to consumers the efficient use of, gas apparatus; as well as the kitchen for the staff dining-room.

### Waterless Holder.

The visitors were then conveyed to the Woodford gasholder station, which at one time was the works of the Woodford and Chigwell Gas Company, and came into the possession of the Gas Light and Coke Company in 1912, as the result of amalgamation. No gas is manufactured here; the supply being derived from Beckton Works by high-pressure trunk main.

The plant consists of two gasholders and a governor and booster house. There is a two-lift column-guided holder in an above-ground steel tank. The outer lift of the holder is 101 ft. in diameter, and the bell is 48 ft. high when fully inflated. The holder has a working capacity of 350,000 c.ft., and gives a pressure of 6·3 in. water gauge.

The main item of interest here, however, was a tankless holder, at present under construction by Messrs. R. & J. Dempster, Ltd., of Manchester. This will have a capacity of 1,000,000 c.ft. The holder is in the form of a sixteen-sided polygon, having a diameter face to face of stanchions of 99 ft. 3 in., and face to face of side plates of 97 ft. 3 in. The height from the foundation to the eaves of the roof will be 150 ft. 3½ in. There will be 53 tiers of side plates to the lower side of the roof lights. The side plates, specially shaped to a girder formation, are 0·18 in. thick. The whole shell is covered by a roof with steel principals, boarded and felted, in the centre of which is a steel ventilator. Immediately below the eaves of the roof is a set of glazed lights, and at four points below this are vent pipes to guard against over-inflation of the holder.

The floating piston is constructed of steel sections and carries the tar seal which maintains a gastight joint. The working capacity of the tar seal trough is 2500 gallons, and about 35 tons of special tar are kept in circulation. There are eight overhead tanks, eight ground tanks, and eight self-contained electrically driven pumps with automatic control. The motors are 1 H.P., and each pump should operate ten times daily for a five-minutes' period. The piston is loaded with concrete blocks so as to throw a working pressure of 10 in. water gauge.

Access to the interior of the holder for inspection of the disc, seal, &c., is provided by a series of staircases between the horizontal galleries around the outside of the holder leading to a manhole in the roof. From this manhole a short ladder leads to a landing, from which depends a double-folding ladder attached to the disc. The inlet and outlet pipes are 18 in. in diameter.

The holder is supported upon a combined mass and reinforced concrete foundation, the load upon which is less than 100 lbs. per sq. ft., except around the circumference, where the maximum load is 1¾ tons per sq. ft. The foundation was constructed to the Company's designs by Messrs. W. & C. French.

During the inspection of the holder, the visitors were joined by Mr. Thomas Hardie, the Chief Engineer of the Company.

### The Stratford Works.

Motor coaches were in waiting to take the party to the Stratford Works of the Company; and, arrived here, the visitors were received by Mr. Hutchence, the Engineer of the Station.

These works cover 17 acres, and in addition to the manufacturing plant include the eastern stores and gas sales department. Coal is received by rail and by river; the coal being unloaded and conveyed to the retort houses and storage by telpher machines equipped with 30-cwt. "Barnard" grabs. An extension to the telpher system is in course of erection, and when completed will enable coke and clinker, &c., to be handled by grab and conveyed to the coke washing plant, loaded into lorries, or conveyed to storage.

The carbonizing plant consists of three houses. No. 1 House comprises ten settings of eight Glover-West vertical retorts. Each retort has a throughput of 3 tons per 24 hours; the capacity of the house being 3·4 million c.ft. (17,000 therms) per 24 hours. The house is fitted with very complete coal and coke handling plants, with overhead coal storage hoppers for 36 hours' consumption, and coke hoppers having a capacity of 200 tons.

No. 2 House comprises a bench of 22 horizontal settings of eight retorts; charging and discharging being by Fiddes-Aldridge machine. The average weight of charge is 10·5 cwt., and the duration 10 hours. The capacity of the house is 2·5 million c.ft. (14,000 therms) per 24 hours.

No. 6 House, now obsolete, contains eight inclined settings of nine retorts, and had a capacity of a million c.ft. per 24 hours.

The carburetted water gas plant is now in course of reconstruction, and upon completion will consist of two C.W.G. plants with self-clinkering boiler generators, each of 2¼ million c.ft. daily capacity, and one existing hand-cleaned generator plant of 1 million c.ft. daily capacity. All three plants are equipped with waste-heat boilers. After water-tube condensers, the gas passes into one of two 630,000 c.ft. relief holders.

The steam power for the works (excluding the C.W.G. plant) is supplied by two Spencer-Bonecourt fire-tube waste-heat boilers, 17 ft. by 6 ft. 6 in., situate in No. 1 Retort House, and by two boilers of the same make, 18 ft. by 6 ft., situate in No. 2 House. As a stand-by there is a battery of three direct-fired Lancashire boilers. A "Permutit" water softening plant of 1500 gallons per hour capacity treats the boiler feed water.

With regard to the telpher system, the track, including the extension at present being erected, will be approximately 2100 ft. in length, and will have three m. chines, each with a

net lifting capacity of 30 cwt. at 70 ft. per min., and travelling speed of 500-600 ft. per min.

### WELCOME TO STRATFORD.

Following tea, which was served in the Club Room at the works,

Mr. HUTCHENCE welcomed the Association to Stratford. Speaking about the visit, he observed that the showrooms at Woodford represented the Company's latest practice. Also at Woodford the visitors had been able to inspect the latest in gasholders, which had the advantages of low cost—the total cost of the 1,000,000 c.ft. holder was only £18,000—and of ensuring constant pressure irrespective of the amount of gas in the holder. As for the Stratford Works, these contained the oldest installation of Glover-West continuous verticals in the Company. They were erected in 1921, and the average gaseous yield at the present time was 78 therms per ton. The present retorts had been working for 1150 days, during which period each had carbonized 3300 tons of coal; and it was intended to operate them for a further 300 days before letting them down, in which case each would have carbonized 4300 tons of coal. The horizontal house also had its features of interest. The settings were non-regenerative, and the Chief Engineer decided that it was a good place to instal a complete waste-heat boiler system. When on full winter load, they obtained from waste heat no less than 98½ p.ct. of the total steam requirement of the works. Then there was the telpher plant, and the manufacturers claimed that this, which was 800 yards in length, was the longest track of its type in existence. It was laid out to cover the whole of the works, and he thought the cost of handling was very low.

Mr. LEONARD LACEY, B.Sc. (President of the Association), remarked that theirs was the first Junior Association which had inspected a tankless holder. Regarding the Stratford Works, as Mr. Hutchence had said, there was little regeneration of heat in the horizontal settings, but this was counterbalanced by the waste-heat boilers. It was remarkable that during the past twelve months 80 p.ct. of the total steam requirements had been generated from waste heat, and that during the six months of maximum load, over 90 p.ct. of the total was thus generated. Another point of interest in the Stratford Works, which doubtless all members had noted, was the extensive use of electricity. In concluding his remarks, Mr. Lacey said how grateful the Association were for the presence of Mr. Hardie.

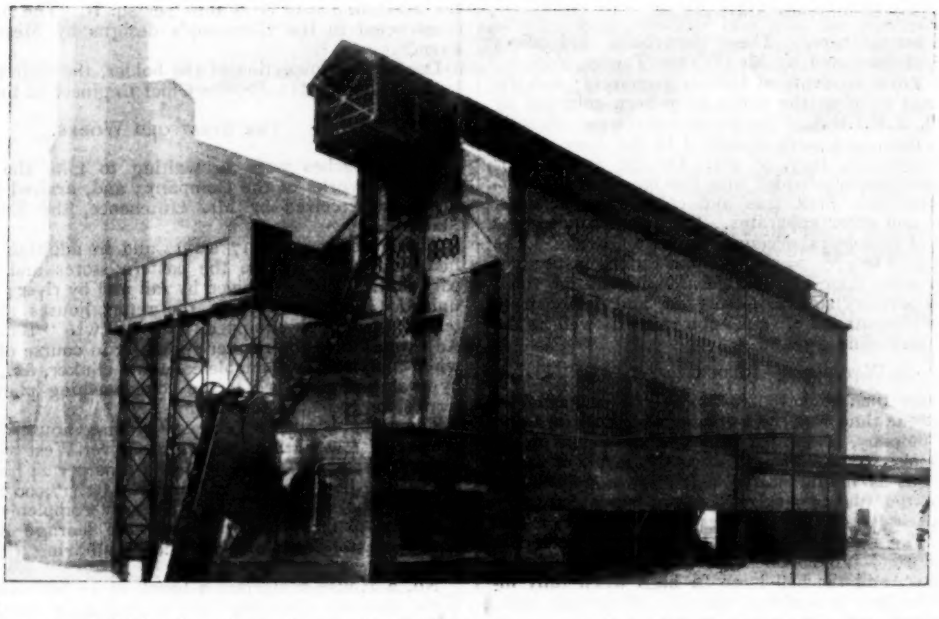
### VOTE OF THANKS.

Mr. W. T. KENSHOLE (Lea Bridge), in proposing a vote of thanks to the Governor and Directors of the Gas Light and Coke Company, coupled with the names of Mr. Hardie, Mr. Hutchence, and the guides, said that the visit—and in particular the inspection of the tankless holder—must be counted a great success. At first many engineers had regarded the waterless holder with feelings mingled with a certain amount of suspicion, in spite of the fact that many of this type had been erected in America. However, having had the opportunity of investigating one in course of construction, he thought all present would appreciate the wisdom of the Gas Light and Coke Company's policy in taking steps to adopt the tankless holder. It was true that the Company were not the first to erect one in this country, but they were the only Company who had gone in for them on a large scale. The Stratford Works had been the means of altering the outlook of carbonizing engineers, for it was here that the first real attempt had been made to utilize the whole of the surplus heat of a gas-works. When it was borne in mind that 98 p.ct. of the total requirements of steam was generated by surplus heat on a works of a capacity of about 10 million c.ft. a day, they would be able to appreciate the enormous saving in fuel costs which had been effected.

Mr. J. H. GOLDSMITH (South Suburban Gas Company) seconded the vote; and Mr. HARDIE, in a brief reply, congratulated Mr. Lacey on the successful session which had been enjoyed by the London and Southern District Junior Gas Association.

## GLOVER-WEST RETORTS AT ROCHDALE.

**From the March Issue of "West's Gas."**



The Rochdale gas undertaking has always been animated by a progressive spirit. The original installation of vertical retorts on the Glover-West system of continuous carbonization was erected in 1911. In 1919 the retorts were reset in units of two, and later the producers (the original of the horizontal bar grate type) were rebuilt with step grates.

When resetting again became necessary in 1927, it was decided to take advantage of the important development in the Glover-West system by the introduction of the 25-ft. "steaming" model. Estimates showed that the difference in cost between an ordinary resetting and a reconstruction on the "New Model" lines would be no more than the cost of new plant of a capacity equal to the increase in the capacity of the original plant by the reconstruction. Further, it was seen that the number of workmen who attended to the installation would not be increased by the reconstruction; they would have no more work to do, and the labour cost per unit of gas produced would be considerably decreased. A number of reconstructions on these lines had already been carried out, and the advantages had been immediately evident. To be able to make an extension of 25 to 50 p.ct. of one's carbonizing plant on the same ground area and without increase of labour cost was an inducement which was sure to be accepted whenever circumstances warranted it.

Rochdale adopted the policy in a slightly different form. It was decided to replace the original 40 retorts by 24 retorts of the "New Model," giving a 50 p.ct. increase of gas-making capacity. At the same time, extensive additions to the coal and coke plant were effected. Gas-making commenced in the reconstructed bench in November, 1927. The new plant has amply justified its existence, and expectations of it have been fully realized.

H. S.

**Gas Publicity at Blackburn.**—Much attention was created at the Blackburn Public Halls, on April 14, by the exhibits of the Corporation Gas Department in a trade event visited by thousands of people. The latest gas appliances were shown, and considerable business has resulted therefrom.

**Newport (Salop) Gas Company.**—At a meeting of the Newport (Salop) Urban Council, it was moved that, in view of the termination of the lease to the present Gas Company, the Council were of opinion that the time had come when the Marsh Trustees should consider the future of the undertaking. The motion was passed.

# REGISTER OF PATENTS.

## Automatic Valves.—No. 286,831.

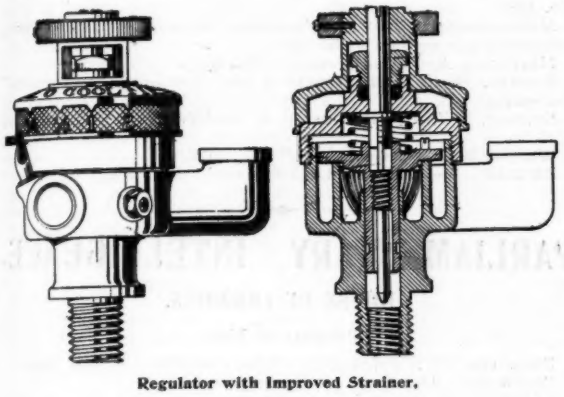
YATES, H. J., of Grosvenor Place, S.W. 1, HOWLETT & CO., LTD., of Birmingham, and DOLPHIN, J., of Hampden-in-Arden.

No. 451; Jan. 6, 1927.

The object of this invention is to provide an automatic valve for the regulation of gas supply incorporating an improved construction and arrangement of grit strainer.

The valve comprises a casing having upwardly projecting walls and having an inner annular wall spaced therefrom forming an inner chamber, an inlet passage for the gas communicating with the inner chamber, an outlet passage for the gas communicating with the space

FIG. 1. FIG. 2.



Regulator with Improved Strainer.

around the annular wall, the latter forming a seating for a valve of mushroom formation adapted to be controlled by suitable means, and a part-conical grid or strainer mounted within the inner chamber with its larger diameter uppermost. The periphery of the strainer at its upper end engages with the inner surface of the annular wall; the lower end of the strainer being closed by the base of the chamber or a part associated therewith, whereby the gas entering through the inlet passage will be caused to pass through the openings in the grid or strainer before escaping past the mushroom valve and through the outlet passage.

We reproduce a side elevation and section which will make clear the construction of the valve.

## Regenerator Settings.—No. 286,835.

BROADHEAD, R. W., of Huddersfield.

No. 1323; Jan. 17, 1927.

According to this invention, instead of the producer being arranged internally within the retort setting it is placed externally, and the space that is normally occupied by the producer is utilized for accommodating a regenerator designed for effecting the direct transference of heat to the incoming producer gas and secondary air. The usual dummy arch behind the internal producer may be done away with, and the space that was formerly taken up by it may also be used for a regenerator. The main flue may remain as at present—that is to say, it may pass through the regenerator, or alternatively it may be let into the ground so that the whole of the area or space thus left underneath the setting may be used by regenerators, as distinguished from the usual practice in which the regenerator comprises two or three rows of tubes at opposite sides of the internal producer.

The regenerator tubes may be arranged in the form of a block or nest situated within the confines of the retort bench, or alternatively they may extend beyond the latter to any desired extent on one or both sides of the bench. In either arrangement the stage floor and setting may be arranged nearer to the ground level than in the case where an internal producer is used.

In addition to the regenerator being provided with waste gas and secondary air flues, it may be furnished with another set of flues for preheating the incoming producer gas, or alternatively assisting in preheating the secondary air. By this increased regeneration, more of the sensible heat of the waste gases is retained; and as it does not leave the setting, the temperature of the producer gas and secondary air is raised so that when coming into contact for combustion, they give a longer flame, enabling the number of tiers of retorts to be increased.

## Discharging Retorts.—No. 286,846.

HOLLANDER, C., and GIBBONS BROS., LTD., both of Bridge Street, S.W. 1.

No. 3328; Feb. 5, 1927.

In one form of apparatus according to this invention, a tray or skip is carried on a lift which moves in a framework adjacent to the discharge end of a battery of retorts, and may be capable of travelling laterally. The skip is mounted on a shaft lying in the direction of travel of the framework and carried in suitable bearings on the lift. A motor carried on the lift drives the shaft through suitable reducing gear in either direction so as to rock the skip towards or away from the retorts. The skip may have the form of a box with open ends, and may be of less width at its ends than at the central portion; the open end adjacent to the retorts being advantageously of substantially the width of the discharge end of the retort.

In operation, the skip is brought into position opposite the retort to be discharged, by suitable movement of the framework and the lift, and the charge in the retort is pushed on to the skip by the usual ram. If the charge of coke is to be supplied to the producer, the skip is then brought into a suitable position, relatively to the throat, and rocked so that it is inclined downwardly towards the throat sufficiently for the charge to slide into the producer; if, however, the charge is to be otherwise disposed of, the skip is rocked in the opposite direction, and the coke is thus delivered on to a bench at the side of the framework remote from the retorts, where it may be quenched in the usual manner.

## Control of Calorific Value.—No. 286,758.

CARR, W. M., of Stretford.

No. 28,649; Nov. 13, 1926.

In accordance with this invention, the calorific value of the gas supplied to the district is controllable, where diluting is carried out, by taking a continuous sample of the crude mixed gas at a point adjacent to the outlet of the mixing apparatus or adjacent to the retort where dilution is effected therein, and conveying same through a by-pass to the gas main in which is an exhauster for the purpose of ensuring a rapid flow in such by-pass so that the sample to be utilized varies in quality practically simultaneously with any variation in the main. The sample is cleaned, governed, and controlled for variations of atmospheric temperature and pressure, and for gravity of gas, and burnt in a suitable burner. Any variation in the calorific value of the mixture of gas in the main will (due to the action of the exhauster) produce a practically immediate variation in flame temperature at the burner, which variation is caused to operate an electrical or other device (such, for example, as that described in Patent Specifications Nos. 213,350 and 213,868) which in turn controls a carefully balanced valve fixed in the main supplying the diluent gas, or the steam valve in the case of a plant where steaming is in operation. By this means, the degree of dilution of the coal gas is automatically varied to give a uniform quality of mixture.

## Incandescent Burners —No. 286 866.

GOULD, F. J., of Grosvenor Place, S.W. 1.

No. 4857; Feb. 21, 1927.

The patentee claims an incandescent gas burner having in combination the following: A Venturi tube having adjustable air inlets and a gas regulator at its upper end; a nozzle made in two parts, the upper part being adjustably fixed to the tube by a lock nut, and the two parts being screwed and cemented together; the lower part having an inside thread and screwing on to an outside thread on the upper part; a shoulder in the lower part below the thread, and a perforated disc or screen resting on the shoulder.

## Gas Fires.—No. 286,953.

OAKLEY, P., RICHARDSON, W. H., and STOVES LIMITED, all of Rainhill.

No. 18,336; July 11, 1927.

This invention refers to the ventilating properties of gas fires, and consists in the provision of a vertical air flue, open at its lower end to the room, located within the main frame or body of the stove, or constituted by a removable plate in conjunction with the back of the firebrick or a metal plate against such back, having a branch outlet at its upper end opening direct into the chimney below the usual outlet flue nozzle of the stove; the combination with such flue of separate air flues within or at the back of the stove, each open at its lower end to the room and having branch outlets at their upper ends opening direct to the chimney and located adjacent to, but outside, the usual outlet flue nozzle of the stove.

Modifications of the invention consist in arranging the single or combined air flues with their upper ends to open into slots formed in the flue nozzle, and the combination with the improved arrangements of air flues of a stove canopy having a passage for the products of combustion from the radiants and firebrick back and a separate passage of air from the room; the ventilating passages of the air flues opening directly into the ordinary chimney flue or into the outlet flue nozzle of the stove.

## Lubrication of Meters.—No. 287,290.

SMITH, E. W., and SMITH METERS LTD., both of Kennington Park Road, S.E. 11.

No. 4115; Nov. 14, 1927.

This invention relates to the internal lubrication of dry gas meters, and refers more particularly to the sump and the means for applying the lubricant supplied from the sump to the valves.

Hitherto it has been the practice to fit the sump above the valve plate, the result being that any excess of lubricant thrown has remained on the valve plate and been wasted; or it has been proposed to arrange the sump on the valve plate so that the lubricant would creep up and cover the valves, the seats of which were raised.

According to the present invention a wick applies the lubricant in the sump to the valves; and the sump is so placed that the lubricant draining from the valves returns of its own accord to the sump. If desired the valve plate may be slightly inclined towards the sump, to drain the oil back into it more efficiently.

In order to load the wick with oil it may be arranged to dip into

the sump, or an arrangement in accordance with Patent No. 283,357 [see JOURNAL, Vol. 181, p. 633] may be used.

The sump may be formed in some meters by utilizing the space between the diaphragm and the top corner of the diaphragm chamber on either side or both if required. In others, provision may be made for carrying the sump on the outside of the meter case.

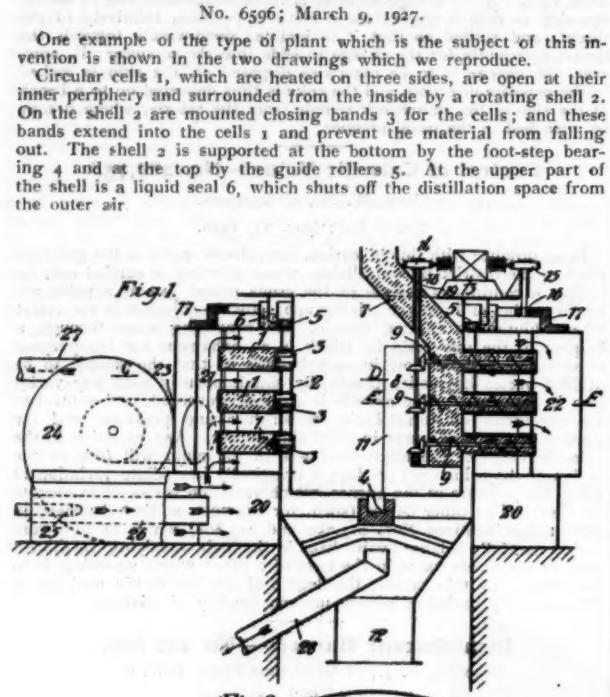
## Low-Temperature Carbonization.—No. 287,313.

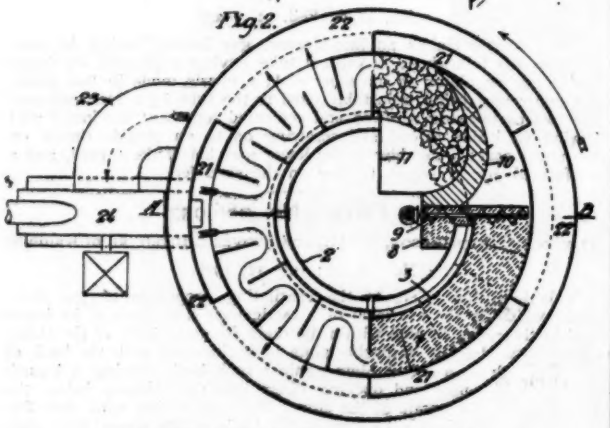
PLASSMANN, J., of Duisburg.

No. 6596; March 9, 1927.

One example of the type of plant which is the subject of this invention is shown in the two drawings which we reproduce.

Circular cells 1, which are heated on three sides, are open at their inner periphery and surrounded from the inside by a rotating shell 2. On the shell 2 are mounted closing bands 3 for the cells; and these bands extend into the cells 1 and prevent the material from falling out. The shell 2 is supported at the bottom by the foot-step bearing 4 and at the top by the guide rollers 5. At the upper part of the shell is a liquid seal 6, which shuts off the distillation space from the outer air




Low-Temperature Carbonization Plant.—Plassmann.

The fuel is conveyed through the feeding shaft 7 to the charging shaft 8, and is charged into the circular cells by means of charging worms 9. On the shell rotating in the direction indicated by the arrow, the scraper 10 conveys the coke into the delivery shaft 11. From the delivery shaft 11 the coke falls into the bunker 12, from where it is conveyed away by suitable means.

The furnace shell 2 and the worms 9 are driven by the motor 13, which is mounted on the furnace shell and drives the worms 9 through gear 14. On the other side of the motor the worm gear 15 is provided, which drives the pinion 16 which meshes with the stationary ring of teeth 17. On the pinion 16 being rotated, the shell 2 of the furnace is turned in the direction indicated by the arrow. The driving shaft 18 for the worms 9 is guided in a sleeve 19 extending through the feeding shaft 7.

The furnace is heated by circulating gases which flow from the annular passage 20 and the passages 21 through the heating cells in the direction indicated by the arrows and pass through the collecting passage 22 and the branches 23 to the circulating fan 24. From the circulating fan 24 the heating gases are returned to the annular passage 20 and back to the fan. In the lower part of the casing of the fan 24 a burner 25 and combustion pipe 26 are so arranged that the heating gases sweep round 26, and only mix with the heating up gases in the annular passage 20. The excess gases are conveyed away through the pipe 27 fixed to the fan casing. The distillation gases are withdrawn from the inner parts of the furnace through the pipe 28.

It has been found that the arrangement may be suitably combined with such devices for low-temperature carbonization as also consist of alternately superposed annular distillation and heating chambers, in which however the distillation chambers are open at the outer periphery, while the annular heating chambers are closed at the outer periphery and open at the inner periphery.

This combination is also described and illustrated in the specification.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official Journal" for April 4.]**

Nos. 9011—9821.

BARRETT COMPANY.—"Distillation of tar." No. 9069.
EDMUNDS, M.—"Apparatus for regulating gas supply." No. 9771.
GOLDSPINK, G. E.—"Gas meters." No. 9212.
KIRKEWHITE ENGINEERING COMPANY, LTD.—See Goldspink, G. E. No. 9212.
LANGER, R.—"Thermostatic controls for gas burners." No. 9526.
MALLET, M.—"Gas washers." No. 9512.
MASCHINENFABRIK AUGSBURG-NURNBERG AKT.-GES.—"Gasholders." No. 9808.
MASCHINENBABRIK AUGSBURG-NURNBERG AKT.-GES.—"Double-acting two-stroke gas engines." No. 9522.
MATTHEWS, A.—"Gas heaters." No. 9577.
PEEBLES, W. C., AND PEEBLES & CO., LTD.—"Gas governors." No. 9628.
SIMPSON, J. F.—See Peebles, W. C., and Peebles & Co., Ltd. No. 9628.
WESTER, K. R.—"Gas stoves." No. 9188.
ZWILLING, L.—"Electrical gas lighters." No. 9282.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF COMMONS.

### Progress of Bills.

Dover Gas Bill: Referred to a Joint Committee of both Houses.
Cockermouth Gas Order: Copy presented.
Littlehampton Gas Order: Approved.

### International Illumination Commission.

Sir R. THOMAS asked the President of the Board of Trade whether, in view of the importance of efficiency in artificial lighting, as affecting the eyesight of the nation, his Department would be represented at the International Illumination Commission to be held in America in September next; and whether facilities would be given for representatives of the National Physical Laboratory and other public institutions also to be present.

Sir P. CUNLIFFE-LISTER replied that his Department would not be represented at the Conference; but His Majesty's Government would be represented through the Department of Scientific and Industrial Research. He understood that certain of the technical and industrial organizations concerned in the subject would also send representatives.

# LEGAL INTELLIGENCE.

## ILLEGAL GAS CONNECTION.

### Heavy Fines.

The Chesterfield Magistrates heard a remarkable story when George Henry Lager, butcher, of Hillstown, and his son, Howard Lager, motor mechanic, were accused of laying a pipe to communicate with another pipe for conveying gas belonging to the Shirebrook Gas Company without the consent of the Company.

Mr. A. M. Lyons said the Company regarded it as a very serious case, and asked for a severe penalty. Defendants, if found guilty, were liable to a fine of £5 and the payment of £2 for every day on which it was held they had illegally obtained and used the gas. Some years ago a gas service pipe to a building (which was then used as a slaughter house by Lager, Senior, but was now a mechanic's shop for the son) was put out of commission, and the end was plugged. The allegation was that this pipe had been tapped by Howard Lager, who had used the gas thus obtained, which did not pass through a meter, to drive a petrol engine. The engine charged accumulators and supplied the father's house with electricity.

Giving evidence, Howard Lager said that some years ago, when knocking down a wall, he found an old iron pipe; and on taking off a nozzle, gas came out. About three weeks ago he put down an engine to charge batteries; and as it did not run very well on petrol, he connected it, as an experiment, with the gas pipe, which he thought was run from the meter. His father had nothing whatever to do with the business.

George Lager said he knew his son was getting a supply of gas; but he was not aware where it came from.

The Magistrates fined each defendant £5; and they were ordered to pay £20 each for using the gas, together with the costs and £5 5s. advocate's fee. The total amount each defendant had to pay was thus £27 12s. 6d.

**Bridgwater Gas Light Company.**—At the annual meeting of the Company, Mr. F. C. Foster, J.P. (Chairman), said they were enabled to pay not only the usual dividend for the year, but from the balance available to carry the amounts allowed by statute—viz., £286 to the reserve fund, £778 to the establishment of a renewal fund—and £1181 to next year's accounts. The increase in the consumption of gas was satisfactory, more than a million c.ft. over 1926.

# MISCELLANEOUS NEWS.

## SOUTHPORT GAS-WORKS EXTENSIONS.

### Ministry of Health Inquiry.

Mr. G. Ewart Rhodes, M.Inst.C.E., Engineering Inspector, conducted a Ministry of Health inquiry at the Southport Town Hall on April 3 into the application of the Southport Corporation for sanction to borrow £14,000 for additional plant at the gas-works. There were present the following members of the Gas Committee: Councillors J. Hindle (Chairman), F. Scott (Vice-Chairman), T. Scholes, J. M. Petrie, and T. Ball, together with the Town Clerk (Mr. J. E. Jarratt), the Deputy Town Clerk (Mr. J. H. Wilkinson), Mr. J. Bond (Gas Engineer), and Mr. A. Hobson (Borough Treasurer).

The TOWN CLERK said the application was for a sum with which to defray the cost of the installation of a rather mixed lot of smaller plant at the gas-works at Crowlands. The Corporation had had recently, owing to the more extensive use of gas, to extend the carbonizing plant. At the moment they were concluding the erection of another complete set of vertical retorts, and it had become necessary, the Gas Engineer advised the Corporation, to increase likewise the capacity of certain supplementary items. The gas undertaking had, during the last twenty-three years, entirely doubled its output; and the position of the gas-works from a financial point of view was, he thought, pretty well exemplified by these two figures: Twenty-three years ago the capital outstanding was £198,000. Last financial year the works had been increased and almost rebuilt to meet this doubled output; yet the capital outstanding was practically the same. The present annual output was about 900 million c.ft.

Mr. JOHN BOND said he had held his present position for twenty-four years. The maximum daily sale of gas last year was 3,600,000 c.ft. The daily capacity of the carbonizing plant when the present alterations were complete would be approximately 4 millions. The subsidiary apparatus was very deficient in relation to the carbonizing plant. They had condensing power for about 1½ million c.ft. of gas per day. The old condensers would remain in operation. Crossens and Banks (two districts to the north of the borough) suffered somewhat, because they were not able to give them the pressure required by the Act.

Councillor HINDLE supported the application in detail.

The INSPECTOR asked a number of questions of the different officers of the Corporation, in reply to which it was stated that 98 p.ct. of the ratepayers of Southport were gas consumers. Including this £14,000, the amount spent would be £175,500 in the last four years. The average unaccounted-for gas was 3⅛ p.ct. In 1920 the gas made was 614 million c.ft.; in 1927-28, 909 millions; and it was estimated that in 1928-29 it would be 950 millions. The net loss last year, after paying loan charges, income-tax, and rates, was £14,858. The net profit this year, after wiping out that deficit, would, it was estimated, be about £8000. In 1925-26, £2820 was given in relief of rates; and in 1926-27, £3087.

The INSPECTOR: Why did you give money in relief of rates the year you made a loss?

The BOROUGH TREASURER: The estimate was made when we had no idea that such a disaster as the general strike was coming.

The inquiry was then closed.

## AN EATON ECHO.

More curious revelations as to the methods of Eaton and his satellites in company promotion and money grabbing have been made in the report of the Senior Official Receiver and Liquidator of the Wareham Electric Supply Company, Ltd. (Mr. H. E. Burgess). Although a compulsory winding-up order was made in April, 1927, no statement of the Company's affairs has yet been submitted. No accurate and proper books were kept, and misleading statements and material omissions were made in the statutory returns. The company was incorporated in October, 1920, with an original nominal capital of £5000 (which was afterwards increased), to provide electricity in Wareham and adjacent parishes. The Company became operative in May, 1923. Eaton controlled its transactions and affairs, although not regarded as an officer; and he conducted a continuous campaign of selling capital on the pretence that it was a large and active business. Between June, 1923, and March, 1926, a continuous stream of prospectuses, circular letters, and documents was issued to the public, and Eaton's promoter's shares and debentures and portions of the unissued capital were freely offered for sale. The literature contained unwarranted promises and puffs, and small investors were induced to subscribe to the amount of £27,144. Because of the statutory restrictions, the area of supply could not be developed to make a net profit of more than £400 per annum—just about enough to pay debenture interest. Most of the money was paid over to Eaton and to the E.F.D. Corporation. The irregularities in the conduct of the Company's affairs are so extensive that Mr. Burgess says it is not possible to give a full account of them. The concern was merely a medium for obtaining money from the public for the benefit of Eaton and for the furtherance of his other schemes. The Official Receiver has arranged for the sale of the Company as a going concern on a valuation of £2500. It is anticipated that the realization in the liquidation after payment of costs and expenses will provide a dividend only to the holders of valid debentures. The total deficiency to creditors and shareholders will be approximately £30,000.

**Reduction in Price at Coalville.**—The price of gas at Coalville is to be reduced by 5d. per 1000 c.ft., from 5s. 3d. to 4s. 10d. The Gas Committee of the Urban Council have handed over £500—making £1000 for the year—for the relief of the rates.

## GAS REGULATION ACT APPLICATIONS.

### SPECIAL ORDER.

**United District Gas Company.**

The Company, whose address is the Gas-Works, Adderbury, Banbury, desire to amend section 22 (dealing with the issue of capital by auction or tender) and section 28 (limiting the amount of the carry forward) of the United District Gas Act, 1913, and also to obtain authority to create a renewal fund.

### DECLARATION OF CALORIFIC VALUE.

**Newhaven Gas and Coke Company, Ltd.**—500 B.Th.U. (July 1.)

## COAL TRADE REPORTS.

### From Our Own Correspondents.

### NORTH-EAST COAST.

In point of actual business, the past week has been quiet, owing to the Easter holiday. In anticipation, however, there had been heavy stemming of tonnage, so that the position has remained steady. Better classes of coal are well sold up to the end of the current month, and there has been sufficient inquiry to give confidence for the immediate future. Moreover, collieries are not willing sellers at present for early positions, as they are watching developments in the wage situation in the German mines. Arbitration is taking place on the current agreements, which expire at the end of this month. A stoppage is not anticipated, but any hint of trouble would undoubtedly give a strong fillip to this market. Poland, another strong competitor, is reported to be feeling the pinch of cut prices, and a move is on foot to subsidize exports still further at the cost of home consumers.

Gas coals are being fairly well taken. Wear specials quote 15s. 6d. to 16s. f.o.b., and best qualities ask 15s. to 15s. 6d. Seconds are 13s. 6d. to 14s., with some ordinaries down to 13s. Durham unscreened coking has been in fair demand, and best brands have been asking as much as 14s., with 13s. 6d. to 13s. 9d. about the average price. Best Durham bunker coals have been in strong demand, and are well sold for some time ahead. They are nominally about 14s. 9d., with seconds at 13s. 6d. to 13s. 9d. There is no change in Northumberland steams, which are holding to the minimum agreed prices of 13s. 6d. for best screened sorts downwards. Gas coke is quiet at about 20s. f.o.b. for shipment.

### YORKSHIRE AND LANCASHIRE.

Inquiries are being made in Yorkshire and Lancashire for gas coals, with indications of a slight advance in price.

General industrial coal moves slowly, at fairly steady prices; washed varieties being in particular request at figures operating a month ago.

So far as shipments are concerned, there has yet been no appreciable effect of the Five Counties Marketing Scheme, such demand as there is being confined to the coast-wise trade.

Domestic coal prices have in some instances been inclined to advance during the past week.

Owing to the changing conditions of the trade no price list was issued on the Hull coal exchange last week.

### MIDLANDS.

As a result of the suspension of industrial activities during Easter, there has been some easing of strains which were developing, more particularly with regard to slacks and smalls. This latter remains the point on which immediate attention is fixed in connection with the operation of the Five Counties restriction scheme.

If there has been any unbalancing, it is barely perceptible at the time of writing. Sellers are not driven to put spot lots on the market at any price that offers. So far as the general level of values is concerned, there is little change, however. The stronger position in which it is assumed the collieries will be placed by the control is a bargaining point, and little more.

All the big consuming interests are well secured as regards near requirements. Public utility undertakings have arranged long contracts, and industrialists are generally well covered. Consumption in the metal-working trades has not been on any great scale, the Easter holidays having been prolonged in many cases.

In the Birmingham and South Staffordshire trades the market is being closely examined for signs of change. Merchants report an equable tone at present, but state that conditions have tended to nullify for the time being any effects which were expected to ensue from the launching of the control scheme. The apprehensions of consumers are allayed by assurances that in Warwickshire 50 p.ct. of the collieries have retained a free hand, while in Cannock Chase 25 p.ct. are stated to be outside the control.

**Bombay Gas Company, Ltd.**—The report of the Directors, which will be presented at the ordinary meeting of the Company on Wednesday next, states that the revenue account shows a profit of £20,164, which, added to the profit on Exchange £4603, and the balance of £40,804 brought forward from the previous year, amounts to £65,573. After providing for the payment of interest and the interim dividend paid in November last, and the addition of £1730 to the reserve fund and £219 to the insurance fund, there remains a balance of £51,620, out of which the Directors recommend the payment of a dividend of 4 p.ct. (less income-tax), making 8 p.ct. for the year, which will leave £39,620 to be carried forward to the current year.

## TRADE NOTES.

**"Triton" Chains.**

In a booklet describing the "Triton" chains made by Messrs. William Griffin & Sons, Ltd., Triton Works, Cradley Heath, there is an account of the destruction tests which form a regular feature in the manufacture as carried out at their works.

**Storage Increases.**

Messrs. Firth Blakeley, Sons, & Co., Ltd., of Vulcan Ironworks, Church Fenton, have gasholder contracts in hand at present—among others—for the following gas companies and corporations: Castleford, Folkestone, Chertsey, Raunds, Eye, Selsey, Selby, and Wotton-under-Edge.

**A New Davis Cooker Booklet.**

The Davis Gas Stove Company, Ltd., have published a most attractive booklet for the cooker season. "Alpine," "Front-Line," "Metrocom," and "New World" cookers are described and illustrated, as also are "Rado" boiling burners, the "Regulo" controller, the "Semisol" hotplate, and many other features.

**Gas Showrooms of Falk, Stadelmann & Co., Ltd.**

Messrs. Falk, Stadelmann & Co., Ltd., have published a booklet in which are described and illustrated their gas showrooms at Veritas House, 83-93, Farringdon Road, E.C. 1, which have recently been remodelled and redecorated. Every use to which gas is put in the modern household—lighting, heating, and cooking—is tastefully displayed as it will be seen in the home.

## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

London, *April* 16.

There is rather more steadiness about the market for pitch, and the price is not below 65s. per ton f.o.b.

Creosote is about 8¼d. per gallon f.o.b.

Tar spirits remain unchanged; pure benzole being 1s. 5d. to 1s. 6d. per gallon, pure tuluole about 1s. 10d. per gallon, and 95/160 solvent naphtha 1s. 3d. per gallon.

Pyridine is 5s. 6d. to 6s. per gallon.

### Tar Products in the Provinces.

*April* 16.

Generally speaking tar products markets have remained steady throughout the past week.

There has been decidedly more inquiry for pitch, and Continental sales are reported to have been effected at the basis of 65s. f.o.b.

Creosote oil is steady, and there is a fair demand for both home trade and export.

Water-white products are quiet; and there is some improvement in the market for solvent naphtha.

Naphthalene is steady. There is a fair amount of demand both for pure and for better qualities of crude.

Crude carbolic is still firm, and business is reported to the end of the year.

Cresylic acid continues to fetch good figures, particularly for the best qualities.

There is a good demand for crystals carbolic, and for near delivery makers report that they are fully sold.

Pyridine is still neglected.

The average prices of gas-works products during the week were: Gas-works tar, 46s. 9d. to 51s. 9d. Pitch—East Coast, 62s. 6d. to 65s. f.o.b. West Coast—Manchester, 60s. to 62s. 6d.; Liverpool, 62s. 6d. to 65s.; Clyde, 65s. to 67s. 6d. Toluole, naked, North, 1s. 3d. to 1s. 4d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 8¾d. to 9½d. Heavy naphtha, North, 8¾d. to 9½d. Creosote, in bulk, North, liquid, 7¾d. to 7¼d.; salty, 7d. to 7¼d.; Scotland, 7¼d. to 7½d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.c.t., 2s. 3d. to 2s. 4d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2¼d. per minimum 40 p.c.t., purely nominal; "B" quality, unsaleable.

### Benzole Prices.

There is no change to report from the prices published on April 4.

**Town Gas Boilers (Bonecourt), Ltd.**—This Company was registered on April 10. The capital is £10,000 in £1 shares, and the address Grosvenor Mansions, 82, Victoria Street, S.W.

**Oriental Gas Company, Ltd.**—The Directors have resolved to pay, on May 31, an interim dividend at the usual rate of 3½ p.c.t. less income-tax, on account of the year ending June 30 next.

**Issue of Stock at Slough.**—The Directors of the Slough Gas and Coke Company have authorized Messrs. A. & W. Richards to offer for sale by tender £2000 5 p.c.t. perpetual debenture stock, the minimum price of issue being £97 10s. per £100; and £18,000 ordinary stock, the minimum price of issue being par. Tenders should reach Messrs. Richards, 37, Walbrook, E.C. 4, not later than eleven o'clock on Tuesday next, April 24.

**Haywards Heath and District Gas Company.**—Presiding at the annual meeting of the Company, Mr. E. C. Charleton (Chairman) said that the total make of gas for the year was nearly 114 million c.ft. During the year considerable constructional work had been carried out, and a carburetted water gas plant had been erected. The profit was £4412, which permitted a dividend for the half-year ended Dec. 31, 1927, of 8½ p.c.t. per annum, making 8 p.c.t. for the year. This left £3621 to be carried forward. He announced a further reduction in the price of gas of 1d. per therm as from the next meter readings.

## CONTRACTS OPEN.

**Coal.**

The Belfast Gas Department invite tenders for the supply of coal. [See advert. on p. 200.]

The Gas Committee of Penrith are inviting tenders for screened or washed gas coal. [See advert. on p. 200.]

**Roads, Footpaths, &c.**

The Manchester Corporation Gas Department are inviting tenders for the work and materials required for the construction of roads and footpaths at their Partington Works. [See advert. on p. 200.]

## Imperial Continental Gas Association.

The report of the Directors for the year ended Dec. 31, 1927, which is to be submitted at the ordinary general meeting on May 16, states that the profit for the year is £217,167, which, together with the sum of £61,159 brought forward from the previous year's account, makes a total of £278,326 available for appropriation, out of which an interim dividend of 5 p.c.t. (actual) less tax, amounting £79,039, was paid in November last. The Directors now recommend that there be paid, on May 23, a final ordinary dividend for the year ended Dec. 31, 1927, at the rate of 5 p.c.t. (actual), less income-tax at 4s. in the £, on the nominal amount of the issued capital stock of the Association, making, with the above interim dividend, a total ordinary dividend of 10 p.c.t. for the year. The sum of £120,246 will accordingly remain to be carried forward to the next account. The total output of gas in the towns supplied by the Association in 1927 was 6112 million c.ft., showing an increase of 1·79 p.c.t. on the preceding year. The number of gas consumers on Dec. 31 last was 287,860, which shows an increase of 3·1 p.c.t. in the year. The consumers of electricity totalled 34,830, representing an increase of 3899, or 12·6 p.c.t. The total quantity of electricity sold was 36,223,323 KW.-H., as compared with 31,158,656 KW.-H. in 1926—an increase of 16·3 p.c.t. Satisfactory prolongations of various contracts for the supply of gas and electricity in suburban districts have been obtained.

**Primitiva Gas Company.**—The report of the Directors, which will be submitted at to-day's meeting of the Primitiva Gas Company of Buenos Aires, Ltd., shows a profit for the year of £151,054, which, with the balance carried forward from Dec. 31, 1926, makes £162,663. Out of this, the Directors have allocated £74,000 to contingencies reserve and £76,000 to depreciation and renewals account; leaving £12,663 to be carried forward.

**Darlington Price Reductions.**—The Darlington Corporation have reduced the price of gas by a further 1d. per 1000 c.ft., and the price of coke from 25s. to 20s. a ton. The latter concession has been made in order to encourage the demand for coke for domestic purposes, so as to dispose of a greater proportion of it in the town than has been done in recent years. In spite of all difficulties, there has been a profit of nearly £8000 in the past year.

**Good Working at Belfast.**—At a meeting of the Belfast Corporation Gas Committee, the report of the Auditor of the Ministry of Home Affairs, 1927, was read. The report stated that the results could not be considered other than satisfactory, having regard to the protracted coal strike, which made the year under review the most difficult in the history of the undertaking, and to the further fact that the net price of gas was never above 2s. 8d. per 1000 c.ft.

**Gas Bill Trouble.**—At the Stoke-on-Trent Police Court the City Corporation Gas Department summoned Edith Goddard, of Stoke-on-Trent, for £5 11s. 4d., due for gas consumed, and 7s. 2d., being the cost of cutting-off the gas from the defendant's premises. Her husband, Harold Goddard, was summoned for unlawfully hindering an official of the Gas Department from inspecting the meter. Mr. Harry Taylor (Assistant Solicitor to the Corporation) said that, as Mrs. Goddard's gas account had not been paid, Arthur Wright, an employee of the Gas Department, was sent to inspect the meter and disconnect the supply of gas. The male defendant refused to admit him. Next day the Gas Department cut-off the supply from the outside; and they now proceeded for the recovery of 7s. 2d., which was the cost of the work. The Magistrates ordered payment of the amount due for gas and for the work done in disconnecting the supply, and fined the male defendant 10s. for hindering Wright from inspecting the meter.

**Long Service Rewarded at Portsmouth.**—Twelve pensioned employees of the Portsmouth Gas Company, nine of whom have over a quarter of a century's unbroken service to their credit, were honoured at the Oddfellows' Hall, Portsmouth, on April 12, when joint presentations were made to them on behalf of the Company and their colleagues in recognition of their long service and the high esteem in which they were held. The recipients were Mr. Tom Goodall, who has served under five different Chairmen and four Engineers during the 55 years he has been with the Company; Mr. George Shergold, who during 38 years' service has the record of never being late for work; Messrs. W. Clark and C. Hicks, each of whom has completed 37 years with the Company, C. Budd (30 years), W. Austin and H. Crassweller (each 27 years), J. Clark (26), W. Sparks (25), G. Griffin (22), J. Edwards (13), and S. Rolls (12). Mr. T. H. F. Lapthorn, J.P., Chairman of the Directors, presided, and the careers of the recipients were briefly outlined by Mr. T. Carmichael, the Engineer and Manager. The thanks of the Board were conveyed to them by Mr. Lapthorn, who paid tribute to the faithful and loyal service rendered. The various gifts were then presented amid applause. In returning thanks, Mr. Goodall referred to the numerous changes that had taken place, both in the manufacture of gas and in its distribution, during the 55 years he had been with the Company. He added that his family's association with the Company extended to over 100 years, his father having served before him.

# STOCK MARKET REPORT.

The dominating feature on the Stock Exchange last week was the extraordinary activity in the Funding Loan, the fluctuations in which were so wide that it was described as a newcomer to the speculative specialities. The security is attractive to foreign buyers owing to the interest being paid without deduction of tax, and there is little doubt that the liveliness is due to American influence. The activity, however, was not confined to the gilt-edged market, and very large purchases in the names of Trust companies were made of Undergrounds, Electric, Gas, and a number of Industrials.

Sir Alfred Mond's announcement of the formation of a £2,000,000 company of American and British interests, with the object of providing financial facilities for commercial and industrial concerns in need of capital, has created a great deal of attention, and first impressions of the proposals are decidedly favourable.

In the Gas Market transactions were above the usual number for a short week; and it will be seen from the Table that, apart from *ex* div. reductions in Alliance and Dublin ordinary and Colonial Gas Association, the few price changes were all increases. British ordinary rose 1 point to 113-116; Chester, Liverpool, and Newcastle recorded improvements at the local exchanges; and South Suburban ordinary rose 1 to 105-108. The Primitiva report and accounts were published during the week; and although no distribution is recommended for the past year, it is clear that the Directors have every hope of there being a renewal of dividends at the close of the current year. The Hong Kong and China accounts, which were also issued last week, show satisfactory increases in both sales and profits. The dividend (10 p.ct., free of tax) is the same; and at the average quotation (14) the yield (gross) is £8 18s. 7d. p.ct.—a very attractive investment.

| Issue. | Share. | When ex-Dividend. | Dividends. Prov. Hf. Yr | Dividends. Last Hf. Yr. | NAME. | Quotations. Apl. 13. | Rise or Fall on Week. | Transaction Lowest and Highest Prices. |
|---|---|---|---|---|---|---|---|---|
| £ | | | % p.a. | % p.a. | | | | |
| 171,978 | Stk. | Feb. 9 | 5 | 5 | Aldershot 5 p.c. max. C. . | 70—75 | .. | |
| 412,992 | ,, | | 4 | 4 | Do. 4 p.c. Pref. . . | 69—72 | .. | 71½ |
| 1,551,868 | ,, | Apl. 12 | 7 | 7 | Alliance & Dublin Ord. . | 93—96* | −2½ | 97½ |
| 874,000 | ,, | Jan. 12 | 4 | 4 | Do. 4 p.c. Deb. . . | 64—67 | .. | .. |
| 623,654 | ,, | Mar. 8 | 7 | 7 | Barnet Ord. 7 p.c. . . . | 109—112 | .. | .. |
| 800,000 | 1 | Oct. 13 | 1/7½ | 1/7½ | Bombay, Ltd. . . . . | 22/—24/- | .. | 22/10½—23/1½ |
| 170,000 | 10 | Mar. 8 | 8½ | 8½ | Bournemouth 5 p.c. . . . | 12½—13½ | .. | .. |
| 500,050 | 10 | ,, | 7 | 7 | Do. B 7 p.c. . . | 12—12½ | .. | .. |
| 375,000 | 10 | ,, | 6 | 6 | Do. Pref. 6 p.c. . | 10½—11 | .. | .. |
| 50,000 | Stk. | Jan. 12 | 3 | 3 | Do. 3 p.c. Deb. . | 56—59 | .. | .. |
| 163,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. . | 76—79 | .. | .. |
| 357,900 | ,, | Mar. 8 | 7½ | 7½ | Brighton & Hove 6 p.c. Con. | 115—118 | .. | 116½—117 |
| 341,880 | ,, | ,, | 6/8/6‡ | 6‡ | Do. 5 p.c. Con. | 103—106 | .. | .. |
| 1,387,500 | ,, | Feb. 23 | 5 | 5 | Bristol 5 p.c. max. . . . | 87—88a | .. | .. |
| 855,000 | ,, | Mar. 22 | 8 | 7 | British Ord. . . . . | 113—116 | +1 | 114½—115 |
| 100,000 | ,, | Dec. 22 | 7 | 7 | Do. 7 p.c. Pref. . . . | 114—117 | .. | .. |
| 100,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. | 72—75 | .. | .. |
| 130,000 | ,, | ,, | — | 33/2 | Do. 5 p.c. Red. Deb. | 93—96 | .. | .. |
| 200,000 | ,, | ,, | 8 | 6 | Cape Town, Ltd. . . . | 8—9 | .. | .. |
| 160,000 | 10 | Nov. 24 | 4½ | 4½ | Do. 4½ p.c. Pref. . . | 6¾—7¼ | .. | .. |
| 150,000 | 10 | Oct. 27 | 4½ | 4½ | Do. 4½ p.c. Deb. . . | 72—77 | .. | .. |
| 150,000 | Stk. | Dec. 22 | 4½ | 4½ | Cardiff Con. Ord. . . . | 98—101 | .. | .. |
| 426,650 | ,, | Feb. 23 | 6 | 6 | Do. 7½ p.c. Red. Deb. . | 101—104 | .. | .. |
| 237,980 | ,, | Jan. 12 | 7½ | 7½ | Chester 5 p.c. Ord. . . . | 87—92b | +1 | .. |
| 167,150 | ,, | Feb. 23 | 5 | 6½ | Colombo Ltd. Ord. . . . | 31/—33/- | .. | .. |
| 79,185 | 1 | Oct. 13 | ‡2/- | ‡2/- | Do. 7 p.c. Pref. . . | 20/—22/- | .. | .. |
| 34,496 | 1 | ,, | 1/4½ | 1/4½ | Colonial Gas Assn. Ld. Ord. | 23/—25/-* | −1/- | 25/6 |
| 575,402 | 1 | Apl. 13 | 1/9½ | 1/9½ | Do. 8 p.c. Pref. | 20/—22/-* | −1/- | .. |
| 187,848 | 1 | ,, | 1/7½ | 1/7½ | Commercial Ord. . . . . | 97—100 | .. | 99½—99¾ |
| 4,073,280 | Stk. | Feb. 23 | 5 | 7 | Do 8 p.c. Deb. . . | 57—60 | .. | .. |
| 175,000 | ,, | Dec. 22 | 8 | 8 | Continental Union, Ltd. . | 28—33 | .. | 28½ |
| 800,000 | ,, | Sept. 29 | ‡1 | ‡1 | Do. 7 p.c. Pref. . . | 88—93 | .. | .. |
| 800,000 | ,, | Mar. 8 | 7 | 7 | Croydon sliding scale . . | 105—108 | .. | 103—107¾ |
| 727,550 | ,, | Mar. 8 | 6½ | 7 | Do. max. div. . . . | 81—84 | .. | 82½—83½ |
| 488,100 | ,, | ,, | 5 | 5 | Derby Con. . . . . | 110—115e | .. | .. |
| 492,270 | ,, | Mar. 8 | 7 | 10 | Do. Deb. . . . . | 71—73c | .. | .. |
| 55,000 | ,, | Dec. 22 | 4 | 4 | East Hull Ord. 5 p.cs. . | 76—79 | .. | .. |
| 400,000 | ,, | Mar. 8 | 5 | 5 | Eastbourne 5 p.c. Deb. . | 90—95 | .. | .. |
| 80,000 | ,, | Dec. 22 | 5 | 5 | European, Ltd. . . . . | 8—9 | .. | 8½—8¾ |
| 1,002,180 | 10 | Mar. 22 | ‡4 | ‡6 | Gas Light & Coke 4 p.c. Ord. | 18/4½—18/10½/ | .. | 18/4½—18/7½ |
| 12,708,480 | Stk. | Feb. 9 | 5 | 5/11/4 | Do. 8½ p.c. max. . . . | 63—65 | .. | 64—65 |
| 4,000,000 | ,, | ,, | 8½ | 8½ | Do. 4 p.c. Con. Pref. . | 77—80 | .. | 78¾—79½ |
| 4,127,020 | ,, | ,, | 4 | 4 | Do. 3 p.c. Con. Deb. . | 60—62 | .. | 61—62 |
| 4,008,630 | ,, | Dec. 22 | 8 | 8 | Do. 6 p.c. Br'tf'd Rd. Db. | 102—105 | .. | .. |
| 181,515 | ,, | ,, | 6 | 6 | Do. 5 p.c. Red. Deb. . | 99—101 | .. | .. |
| 1,643,770 | ,, | ,, | 5 | 5 | Do. 7½ p.c. Ilford Deb. . | .. | .. | .. |
| 43,000 | ,, | ,, | 7½ | 7½ | Hastings & St L. 5 p.c. Conv | 87—90 | .. | .. |
| 93,500 | ,, | Mar. 8 | 6¾ | 6¾ | Do. 8½ p.c. Conv. | 68—71 | .. | .. |
| 468,740 | ,, | ,, | 6¼ | 6¼ | Hongkong & China, Ltd. . | 12½—14½ | .. | .. |
| 70,000 | 10 | Oct. 13 | ‡10 | ‡10 | Hornsey Con. 8½ p.c. . | 78—81 | .. | .. |
| 173,300 | Stk. | Mar. 8 | 5 | 5 | Imperial Continental Gas. | 151—155 | .. | 153—155 |
| 1,276,000 | ,, | Nov. 10 | 10 | 10 | Do. 8½ p.c. Red. Deb. | 88—70 | .. | .. |
| 332,130 | ,, | Feb. 9 | 8½ | 9½ | Lea Bridge 5 p.c. Ord. . . | 94—97 | .. | .. |
| 305,242 | ,, | Mar. 8 | 7 | 7 | Liverpool 5 p.c. Ord. . . | 88—89b | +½ | .. |
| 2,145,907 | ,, | Feb. 23 | 5½ | 5½ | Do. 7 p.c. Red. Pref. | 101½—103½b * | .. | .. |
| 600,000 | ,, | Mar 22 | 7 | 7 | Maidstone 5 p.c. Cap. . . | 108—111 | .. | .. |
| 165,736 | ,, | Feb. 23 | 9 | 8 | Malta & Mediterranean . | 5¾—6 | .. | .. |
| 75,000 | 5 | Dec. 22 | ‡7 | ‡8 | Montevideo, Ltd. . . . | 92—94 | .. | 93 |
| 641,920 | Stk. | Nov. 24 | ‡7 | ‡5 | Newcastle & Gateshead Con. | 16/6—17/-d/ | +·/3 | .. |
| 3,001,915 | ,, | Mar. 8 | 5 | 5 | Do. 4 p.c. Pref. . | 66½—67¼d | .. | .. |
| 800,929 | ,, | ,, | 4 | 4 | Do. 8½ p.c. Deb. . | 66½—67¼d | .. | .. |
| 801,705 | ,, | June 29 | 8½ | 8½ | North Middlesex 6 p.c. Con. | 97—100 | .. | .. |
| 181,760 | ,, | Mar. 8 | 6/18/0 | 6/18/0 | Oriental, Ltd. . . . . | 116—121 | .. | 116—117½ |
| 300,000 | ,, | Nov. 24 | 7 | 9 | Plym'th & Ston'house 5 p.c. | 3102—107 | .. | .. |
| 188,130 | ,, | Dec. 22 | 7½ | 7½ | Portsm'th Con. Stk. 4p.c. Std. | 101—104 | .. | .. |
| 414,500 | ,, | Feb. 23 | 7½ | 7½ | Do. 5 p.c. max. | 77—80 | .. | .. |
| 336,732 | ,, | ,, | 5 | 5 | Primitiva Ord. . . . . | 23/—24/- | .. | 23/—24/- |
| 2,394,464 | 1 | — | — | — | Do. 4 p.c. Red. Deb. . . | 92—95 | .. | .. |
| 244,500 | 100 | Dec. 1 | 4 | 4 | Do. 4 p.c. Red. Deb. 1911 | 74—76 | .. | 75—75½ |
| 965,000 | Stk. | Jan. 26 | 4 | 4 | Do. 4 p.c. Cons. Deb. . . | 74—76 | .. | .. |
| 416,345 | ,, | Dec. 22 | 4 | 4 | San Paulo 6 p.c. Pref. . . | 8—8½ | .. | .. |
| 180,000 | 10 | Mar. 22 | 6 | 6 | Do. 5 p.c. Red. Deb. | 46—48 | .. | .. |
| 135,000 | 50 | Jan. 5 | 5 | 5 | Sheffield A . . . . . | 100—102e* | .. | .. |
| 370,000 | Stk. | Mar. 22 | 6 | 6 | Do. B . . . . . | 100—102e* | .. | .. |
| 419,968 | ,, | ,, | 6 | 6 | Do. C . . . . . | 100—102e* | .. | .. |
| 1,047,000 | ,, | ,, | 6 | 6 | South African . . . . | 4—6 | .. | .. |
| 90,000 | 10 | May 26 | 4 | 6 | South Met. Ord. . . . . | 104—106 | .. | 104½—105½ |
| 6,000,895 | Stk. | Feb. 23 | 5 | 7½ | Do. 6 p.c. Irred. Pf. | 109—112 | .. | .. |
| 500,000 | ,, | ,, | — | 6 | Do. 3 p.c. Deb. . . | 59—62 | .. | .. |
| 1,895,445 | ,, | Jan. 12 | 3 | 3 | Do. 6½ p.c. Red. Db. | 99—101 | .. | 101 |
| 784,000 | ,, | Mar. 8 | 6½ | 6½ | South Shields Con. . . . | 110—112d | .. | .. |
| 81,500 | ,, | Feb. 23 | 8½ | 8½ | South Suburban Ord. 5 p.c. | 105—108 | +1 | 106—107 |
| 1,343,736 | ,, | Feb. 23 | 6½ | 8½ | Do. 5 p.c. Deb. | 93—96 | .. | 95 |
| 360,837 | ,, | Dec. 22 | 5 | 5 | South'mpton Ord. 5 p.c.max. | 77—79 | .. | 78½ |
| 191,740 | ,, | Mar. 22 | 5 | 5 | Do. 4 p.c. Deb. | 72—75 | .. | .. |
| 191,375 | ,, | Dec. 22 | 4 | 4 | Swansea 7 p.c. Red. Pref. . | 100—103 | .. | .. |
| 350,000 | ,, | Mar. 8 | 7 | 7 | Do. 6½ p.c. Red. Deb. | 99—102 | .. | .. |
| 300,000 | ,, | Dec. 22 | 6½ | 6½ | Tottenham District A 5 p.c. | 112—117 | .. | .. |
| 190,000 | ,, | Feb. 23 | 7½ | 7½ | Do. B 8½ p.c. | 92—95 | .. | .. |
| 999,375 | ,, | ,, | 6½ | 6½ | Do. 6½ p.c. Pref. | 98—101 | .. | .. |
| 180,000 | ,, | ,, | 6½ | 6½ | Do. 4 p.c. Deb. | 74—77 | .. | .. |
| 181,255 | ,, | Dec. 8 | 4 | 4 | Tynemouth Con. and New | 78–80d | .. | .. |
| 258,951 | ,, | Mar. 8 | 5 | 5 | Uxbridge, Maidenhead, & Wycombe 5 p.c. . . . | 87—90 | .. | .. |
| 259,094 | ,, | Mar. 8 | 6½ | 6½ | Do. 5 p.c. pref. . . | 83—88 | .. | .. |
| 98,930 | ,, | ,, | 5 | 5 | Wandsworth, Wimbledon, and Epsom— | | | |
| 80,000 | ,, | Mar. 8 | 8½ | 8½ | Wandsworth A 5 p.c. . | 129—134 | .. | .. |
| 355,696 | ,, | ,, | 7 | 7 | Do. B 8½ p.c. . | 111—116 | .. | .. |
| 439,695 | ,, | ,, | 5/19/0 | 5/19/0 | Do. C and New | 98—103 | .. | .. |
| 360,000 | ,, | ,, | 6⅝ | 6⅝ | Do. Wimbledon 5 p.c. . | 106—111 | .. | .. |
| 98,000 | ,, | ,, | 7½ | 7½ | Do. Epsom 5 p.c. . . | 112—117 | .. | .. |
| 300,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref . . . | 86—91 | .. | .. |
| 88,416 | ,, | Dec. 22 | 8 | 8 | Do. 8 p.c. Deb. . . . | 57—60 | .. | .. |
| 384,743 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. . . . | 76—79 | .. | .. |

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. f.—The quotation is per £1 of Stock. * Ex. div. ‡ Paid free of income-tax. ‖ For year.

Transactions were recorded during the week:

On Tuesday, Commercial 99¼, Croydon maximum dividend 82½, European 8½, 8¾, Gas Light and Coke 18s. 4½d., 18s. 7½d, 4 p.ct. preference 79, 3 p.ct. debenture 61½, 62, Imperial Continental 153, Primitiva 23s. 6d., 23s. 9d., 23s. 10½d, 24s., South Metropolitan 104¼, South Suburban 5 p.ct. 106, 107, 5 p.ct. debenture 95, Southampton 5 p.ct. 78½. Supplementary prices, Cheltenham 5 p.ct. maximum 77¼, 77½, Liverpool 5 p.ct. 88.

On Wednesday, Alliance and Dublin 97½, British 114½, Continental Union 28½, Croydon maximum dividend 83½, Gas Light and Coke 18s. 4¾d., 18s. 5¼d., 18s. 6d., 18s. 7½d., 4 p.ct. preference 78¾, 79, 3 p.ct. debenture 61¾, Imperial Continental 153½, 154, Oriental 116, Primitiva 23s., 23s. 3½d., 23s. 4½d., 23s. 6d., 23s. 7½d., 23s. 9d., South Metropolitan 105. Supplementary prices, Wandsworth 5 p.ct. debenture 99¾.

On Thursday, Aldershot 4 p.ct. preference 71½, Bombay 22s. 10½d., 23s. 1½d., Bristol 5 p.ct. 87½, British 115, Colonial Gas Association 25s. 6d. *ex* div., Commercial 99¾, Croydon sliding-scale 107¾, European 8⅝, Gas Light and Coke 18s. 4½d., 18s. 5¼d., 18s. 6d., 18s. 7¼d., 3½ p.ct. 65, 4 p.ct. preference 78¾, 3 p.ct. debenture 61, Imperial Continental 153½, 155, Oriental 117, Primitiva 23s. 3d., 23s. 4½d., 23s. 6d., 23s. 7½d., 23s. 9d., 4 p.ct. consolidated debenture 75, 75½, South Metropolitan 105¾. Supplementary prices, Wandsworth 5 p.ct. debenture 99¾.

On Friday, Brighton and Hove 6 p.ct. 116½, 117, Commercial 99¼, 99⅝, Croydon sliding-scale, 105, Gas Light and Coke 18s. 4½d., 18s. 6d., 18s. 6¾d., 3½ p.ct. maximum 64, 4 p.ct. preference 79½, 3 p.ct. debenture 62, Montevideo 93, Oriental 117½, Primitiva 23s., 23s. 6d., 23s. 7½d., 23s. 9d., 23s. 10½d., 24s., South Metropolitan 105, 105½, 105¾, 6½ p.ct. debenture 101. Supplementary prices, Leatherhead 5 p.ct. [Correction from Official List. In the list of transactions for Tuesday, the 3rd inst., the business done in this stock at 102½ should have been marked to the 6 p.ct. preference.] Liverpool 5 p.ct. 88½, Wandsworth 5 p.ct. debenture 99¾.

When business opened in Lombard Street after the holidays the market found itself short of funds, and a moderate amount had to be borrowed from the Bank of England. As the week progressed, however, the position became easier; and at the close old day-to-day loans were renewed at 3½ p.ct., fresh advances paying from 3¾ down to 3¼ p.ct. As expected, Treasury Bills were allotted at a higher rate than the previous week, the average being 7'37d. p.ct. up at £4 0s. 8'54d. p.ct., and discounts were generally rather weaker.

On the Foreign Exchange Market, the dollar-sterling moved slightly in favour of sterling, closing at 4.88⅛. Among European currencies, Italian lire was slightly lower on balance at 92.50½; Belgas dropped to 34.94½; and pesetas to 29.04. Otherwise there was little change; French francs being quoted at an average of 124, and Dutch florins at 12.11.

Silver was quiet, the cash price being 26½d. per oz.; and with no Gold available, the price remained at 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2¼ p.ct. at call and 2⅜ p.ct. at notice.